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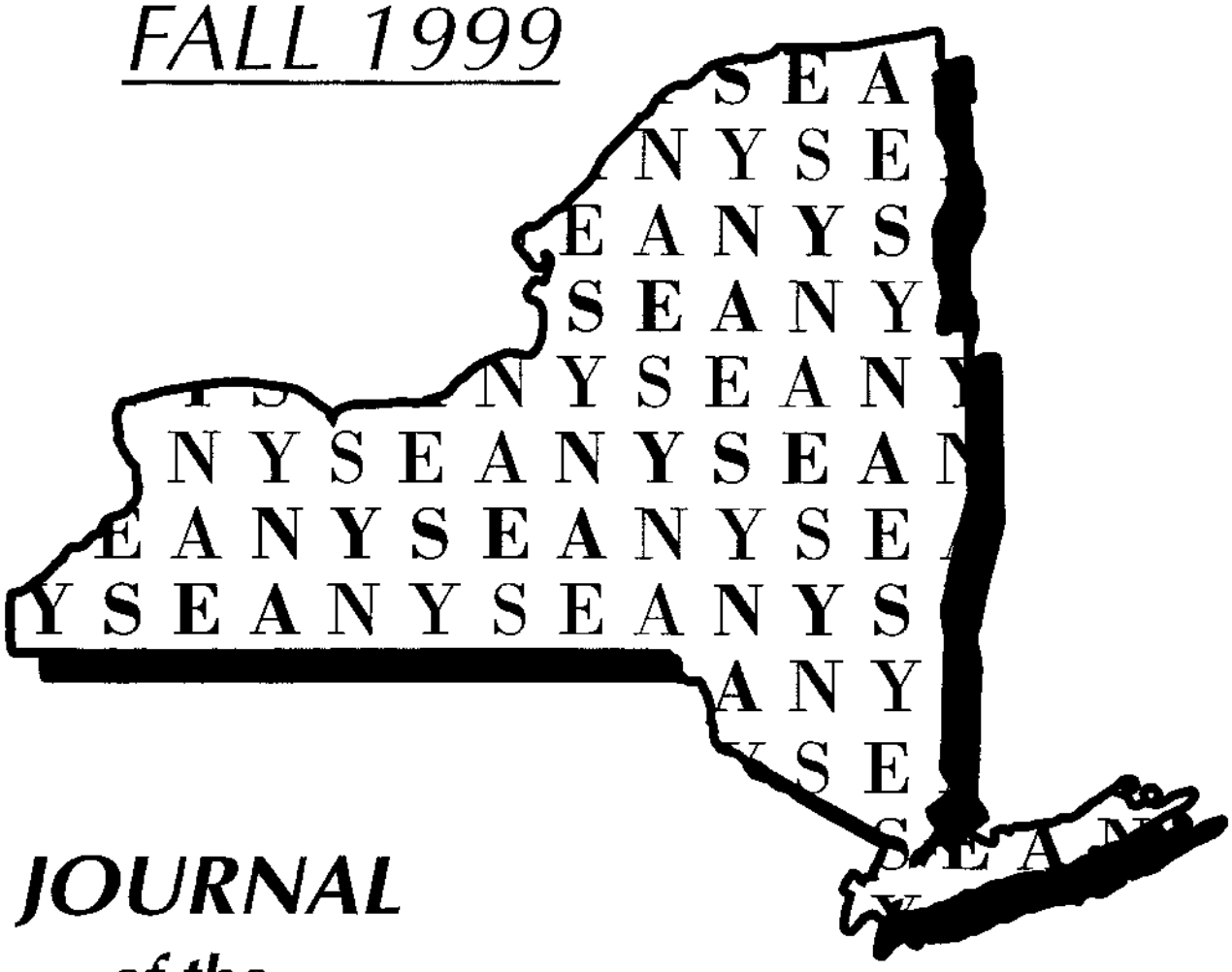

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ARTICLES

EDITORIAL

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THE ROLE OF FISCAL DISPARITY IN EXPLAINING MACROECONOMIC FORECASTING ERRORS

Susanne M. Polley*

I. INTRODUCTION

Policy makers do not intentionally make "bad" policies anymore than bankers intentionally make "bad" loans. Nevertheless, stabilization policies can end up being economically destabilizing. Uncertainties about the economy and the "long and variable lags" in the policy process are typically cited as the roots of procyclical policies. Feeding the fires of a vicious cycle, uncertainty fosters errors in forecasting which further diminish the policy maker's ability to achieve its desired objectives.[1] In order to improve the ability to achieve desired outcomes, the policymaker must uncover these sources of uncertainty. It is proposed here that a potential source of uncertainty, and hence a source of errors in forecasting and policy making, is the fiscal disparity (or the relative changes in fiscal policy) between nations.

We know that our policy makers monitor foreign aggregate demand, interest rates, and exchange rates. We also know that a closed economy analysis is misleading because the policy actions of one country have spillover effects on the economies of its trading partners. As a result, the consequences arising in both economies must be considered when the effects of policy actions are being projected. Acknowledging the direct effects of foreign and domestic policies, however, may still be insufficient for effective policy making. Given the increased "openness" of the U.S. economy, the move towards a global economy, coordination, and economic cooperation, our analysis needs to be more comprehensive and to consider more than just the direct effects of policy.

In this paper it is hypothesized that the *relative* changes in policy, called the fiscal disparity, may be a vital source of information in the policy process. As a result, if policy makers forecast the performance of the domestic economy and set policy instruments without considering the relative consequences of foreign and domestic policy decisions, then those forecasts and the policies based on them could be flawed.[2]

The research in this paper investigates the extent to which the fiscal disparity between the U.S. and the other members of the G7 explains the variance in policy makers' errors in forecasting nominal and real GNP and the GNP Deflator.[3] More precisely, I investigate whether examination and consideration of this fiscal disparity could improve forecasting performance. By recognizing periods of increased fiscal disparity, and incorporating the relative spillover effects into their models, policy makers may reduce the overall level of uncertainty, improve their ability to forecast the effects of policy, and reduce the incidence of policies that turn out to be destabilizing.

The paper is organized as follows: Section II defines the concept of fiscal disparity. A discussion of the data and a test of the potential usefulness to policy makers of fiscal disparity is conducted in Section III. Section IV presents the results, while comments and conclusions are offered in Section V.

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II. FISCAL DISPARITY DEFINED

Fiscal disparity, as described by Paulus (1988), is the measure of "the *relative* movement of U.S. budgetary policy toward stimulus" (p. 5).[4] That is, it is the change in U.S. tax and spending policies *relative* to the tax and spending changes in other countries.

> For example, over the 1981 to 1986 time span, U.S. fiscal policy had swung toward stimulus by an amount equal to about $150 billion—through tax cuts and expenditure increases on discretionary budget items. At the same time, policy abroad moved toward restraint by approximately $100 billion, as foreign governments raised taxes and reduced discretionary expenditures. Thus, U.S. fiscal policy moved $250 billion toward stimulus relative to fiscal policies in other nations, or by the equivalent of about 5% of GNP since the base period of 1981. (Paulus, 1988, p. 5)

The implication is that what is more relevant for forecasting and, hence, for policy making purposes is not the absolute change in U.S. fiscal policy, but the *relative* change in policy. That is, it is possible that policy makers have not erred in their examination of the appropriate domestic fiscal policy variables or indicators and have not erred in their modeling of the effects on the economy; rather, the forecast errors may partially be a result of a failure to adequately account for the relative changes in fiscal policy; i.e., to account for the fiscal disparity.

III. METHODOLOGY AND DATA

Comparative static exercises within a standard open economy model reveal that failure to account for the economic effects resulting from domestic fiscal policy changes *relative* to the simultaneous changes in foreign fiscal policy can result in a significant error in projecting domestic output and prices.[5] For example, if the rest of the world contracts its level of government spending while the U.S. is expanding its government spending, the resulting decline in foreign income will reduce foreign demand for U.S. products. This dampening effect on trade and U.S. real GNP will be further amplified by the appreciation of the dollar which accompanies the rise of domestic interest rates relative to foreign rates.[6] As a result of the disparity between the nations' fiscal policies, domestic real GNP increases by less than if there was no change in foreign fiscal policy. Or stated another way, if the relative changes in policy were not considered, the policy maker would have overestimated the effects on real GNP from the rise in domestic government spending. Consequently, the policy maker's forecast of GNP would be in error. As a result, the effectiveness of its indicators and the likelihood of hitting desired targets (which are based on those forecasts) would be diminished.

The results of such comparative static exercises suggest that there is information in the fiscal disparity between nations which could be exploited to improve forecast accuracy. However, without having the policy makers' actual forecasting models and their actual data, it is difficult to determine whether or not they adequately accounted for fiscal disparity.[7] A good alternative method to determine whether there is unexploited information in the fiscal disparity is to test whether the fiscal disparity can explain the variation in the policy makers' forecasting errors. If the fiscal disparity proves to be a source of the errors in forecasting, then that would imply that there is some information contained in the disparity for which the policy maker has not already accounted. As a result, incorporation of this information has the potential to improve forecast accuracy and, hence, to validate the usefulness of monitoring the fiscal disparity. However, if the policy maker is utilizing this information optimally, the fiscal disparity should not "Granger-cause" its forecast errors. Towards that end, the following simple model was estimated.

$$E_t = a_0 + a_1 \,(\text{Fiscal Disparity})_{t-1} + \varepsilon$$

where E = the policy maker's errors in forecasting nominal GNP, real GNP, or the GNP Deflator

$$Fiscal\ Disparity = \left[\frac{\Delta Structural\ deficit}{PGNP\ (U.S.)} - weighted\ average\ \frac{\Delta Structural\ deficit}{PGNP\ (RG7)}\right]$$

ε = an error term.

Fiscal disparity is calculated as in Paulus (1988). That is, fiscal disparity is the difference between the change in the structural deficit as a percent of potential GNP (PGNP) in the U.S. and a weighted average of the changes in the structural deficits as a percent of potential GNP in the rest of the countries in the G7 (RG7 i.e., the Rest of the G7 countries). Data on the structural deficit are available from the Organization for Economic Cooperation and Development (OECD) and are consistently available only on an annual basis.[8] The fiscal disparity is illustrated in Figure 1. Of particular interest in this diagram is the marked increase in the disparity that occurs around 1980 and persists through 1987—the period corresponding with the Reagan tax cuts and military build-up.

The model would predict a negative coefficient on a_1, for example, if the policy maker overestimated the effects on domestic output and prices. Such a result would occur if domestic fiscal policy moved inversely to the policy in the RG7, as it did during the 1980's.[9] Should the coefficient a_1 prove to be statistically significant, this would indicate that the policy maker had not fully exploited available information which could potentially improve its forecasting performance. In such a case, it could be concluded that the fiscal disparity between countries was a statistically significant source of the policy maker's forecasting error for the sample period examined.

THE DATA

Two sets of financial forecast error data were employed. In addition to evaluating the forecasts prepared by the staff of the Federal Reserve (Fed), an alternative set of forecasts prepared by members of the American Statistical Association - National Bureau of Economic Research (ASA-NBER) was also tested. The growth in the errors in forecasting nominal and real GNP and the GNP Deflator was examined for both forecasters.[10] The forecast error data are expressed in percent changes at seasonally adjusted annual rates and are calculated as the difference between the actual and predicted values from the fourth quarter of one year to the fourth quarter of the following year. The actual figures for GNP and the Deflator were compiled from the Citicorp Economic Database.

Data on the Fed's forecasts were obtained from internal Fed documents and cover the period 1970-1990.[11] The staff of the Board of Governors of the Federal Reserve prepares a set of forecasts prior to every FOMC meeting in which the values of economic variables are projected from one to six quarters out. These forecasts are a blend of both seasoned judgement and large-scale model predictions. The fourth quarter forecast utilized in this research is the forecast made immediately after the release of the preliminary third quarter data. Preliminary data on GNP and inflation are released approximately three weeks following the end of a quarter. The annual forecast is a forecast of the entire year that is made in the fourth quarter of a year and covers the interval to the fourth quarter of the next year.[12]

The ASA-NBER forecasts are the results of a survey. In particular, the median, rather than the mean, forecasts from the approximately forty members of the American Statistical Association who submit their forecasts each quarter are used. The participants in the survey are asked to forecast seventeen major indicators five quarters ahead.[13] Error statistics for both sets of forecasts are presented in Table 1 whereas the forecast error and fiscal disparity data sets are presented in the appendix.

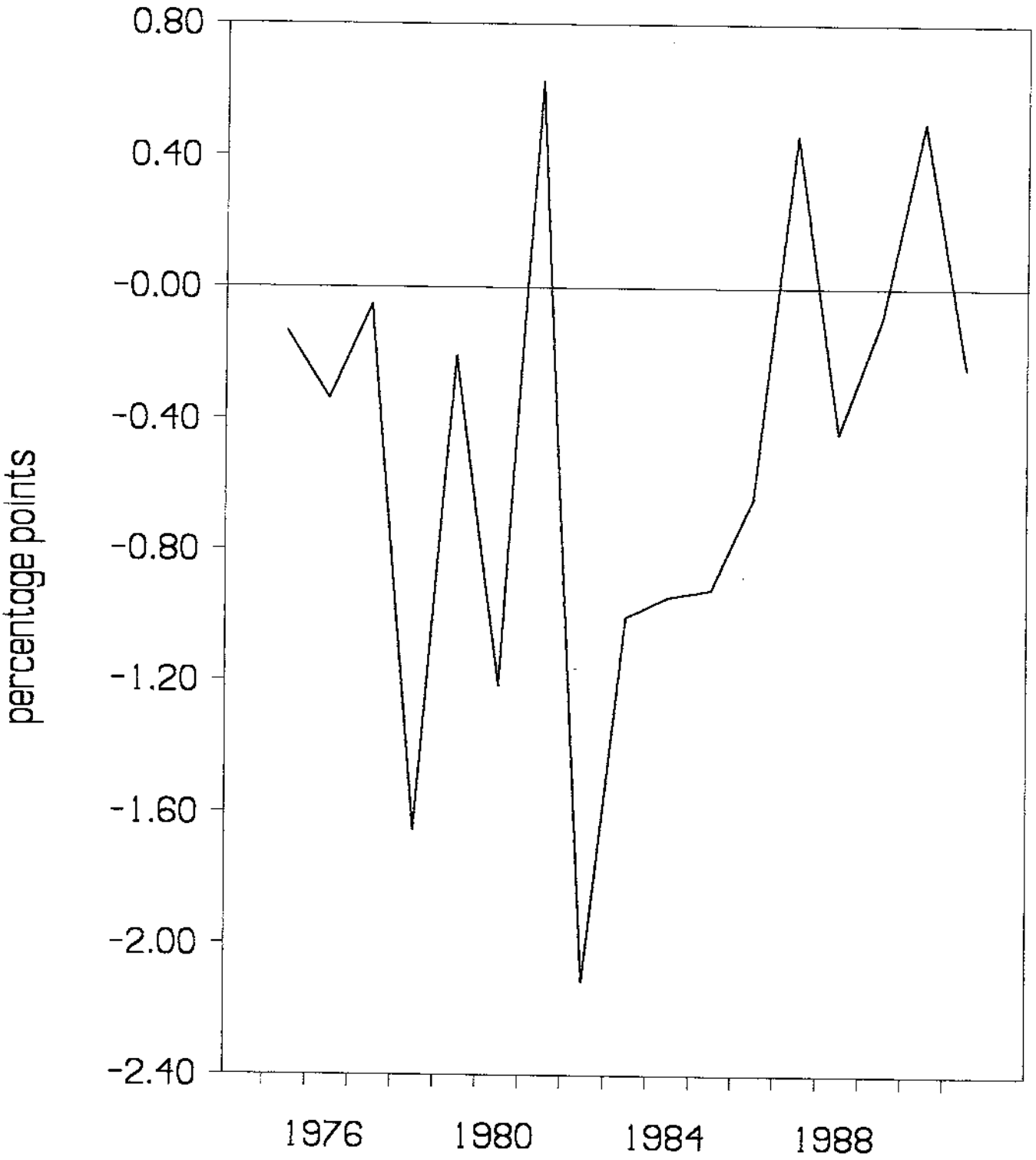

FIGURE 1: Fiscal Disparity Between the U.S. and the rest of the G7 countries.

TABLE 1

Error Statistics for ASA-NBER and Federal Reserve Forecasting Errors 1970:1-1990:1

ASA-NBER FORECAST ERRORS		FEDERAL RESERVE FORECAST ERRORS	
	Mean Error		
Nominal GNP	0.45575	0.57236	Nominal GNP
Real GNP	-0.10082	-0.22181	Real GNP
GNP Deflator	0.55823	0.77888	GNP Deflator
	Mean Absolute Error		
Nominal GNP	1.87755	1.70934	Nominal GNP
Real GNP	2.13798	1.10847	Real GNP
GNP Deflator	0.85966	1.32852	GNP Deflator
	Root Mean Squared Error		
Nominal GNP	2.53561	2.17840	Nominal GNP
Real GNP	2.75355	1.56694	Real GNP
GNP Deflator	1.09238	1.72723	GNP Deflator

The reliability of survey forecasts has been examined by a number of researchers. Both direct and indirect comparisons of private- and public-sector forecasts have been conducted. McNees (1995) compared the accuracy of three "official" public sector forecasts to that of private sector survey forecasts. His findings for the one-year-ahead forecasts reconfirm previous research that the private survey forecasts are about as accurate as those compiled by the public sector. In an earlier study, McNees (1992) observed that forecast accuracy varies over time and that "no single forecaster dominates" in accurately predicting all variables, over all time horizons (p. 32).

Dean Croushore has conducted a considerable amount of research using The Survey of Professional Forecasters data. In his 1996 paper he noted that the inflation forecasts from this survey, among other private sector inflation surveys, were unbiased, but inefficient. "The term inefficient applies to forecasts that could be improved by using additional information" (p. 20). In other research, while their purpose was not to compare the accuracy of private- and public-sector forecasts, Romer and Romer (1996) did find that the Fed has asymmetric information about inflation and real output not possessed by commercial forecasters.[14]

IV. RESULTS

There is evidence to suggest that the fiscal disparity between the U.S. and the other G7 nations may be a source of these policy makers' errors in forecasting real GNP. The regression results reflect a non-trivial relationship between the fiscal disparity and both the Federal Reserve staff's and the ASA-NBER's errors in forecasting real GNP.

While various subperiods were examined, it was the 1980-1987 period that produced the strongest evidence of a statistically significant relationship between the errors in these policy makers' forecasts and real GNP. Over this horizon, marking an expansionary thrust in domestic fiscal policy, the lagged fiscal disparity accounts for more than 70 percent of the Fed's real GNP forecasting errors and over 60 percent of the ASA-NBER members' errors in forecasting both real and nominal GNP. These results were statistically significant at the .05 level and the negative coefficient on a_1 is consistent with the model's predictions as outlined previously.

When the forecasters' errors were evaluated against the *change* in the disparity, evidence of an even stronger relationship was revealed over this time period.[15] Specifically, the change in the fiscal disparity between the U.S. and the rest of the G7 countries explained over 80 percent of the Fed staff's errors in forecasting real GNP and approximately 80 percent of the ASA-NBER's errors in forecasting both real and nominal GNP over the 1980-1987 period. These results for both policy makers were statistically significant at the .01 level.[16] Figure 2 illustrates the relationship between the Fed staff's RGNP forecast errors and the change in the fiscal disparity. Tables 2 and 3 present the Fed staff and ASA-NBER 1980-1987 regression results, respectively. Results of the tests covering the full 1970-1990 sample are also provided as a basis for comparison in these tables.

V. CONCLUSIONS

In this paper the concept of fiscal disparity between the U.S. and the other nations in the G7 is examined. It is anticipated that there is information contained in the fiscal disparity which could potentially improve the policy maker's forecast accuracy, but which has not been consistently measured.

The nominal and real GNP and inflation forecast errors of the Federal Reserve staff as well as the errors of the participants in the ASA-NBER forecasting survey are examined. The results of a simple test indicate that during the years of the Reagan-Bush tax cuts and defense sector spending increases, the 1980-1987 period, the fiscal disparity, especially the change in the disparity, produced evidence of a strong relationship with these policy makers' errors in forecasting our nation's real output. Consequently, an area of uncertainty which has impeded forecasting performance has been revealed. Thus, the results suggest that there is room for improving the accuracy of both private- and public-sector forecasts.

These results further indicate that when domestic fiscal policy is aligned with that of our major trading partners as it was for the most part prior to 1980, the fiscal disparity between nations does not adversely affect forecasting performance. And we can conclude rather confidently that whatever information is contained in the disparity was adequately accounted for by our nations' policy makers when preparing their forecasts of output and inflation. However, in periods like the 1980's when nations' policies diverge, these policy makers were not as efficient in gauging and/or modeling the fiscal disparity information.

It has been suggested that the volatility of the exchange rate during the 1980s is the source of the relationship observed between the policy makers' forecast errors and the fiscal disparity variable. However, in other tests, a trade-weighted index of the dollar exchange rate was not a statistically significant source of these policy makers' forecast errors. In addition, the variation in the forecast errors is not explained by the fluctuations of domestic fiscal policy or by movements in foreign fiscal policy. Consequently, the argument that the policy maker may be adequately gauging movements in the home (or foreign) policy, but is weak in accounting for changes in the other policy, cannot be supported by the empirical tests.[17] Rather, what appears to be a weakness in the forecasts over this time period is the

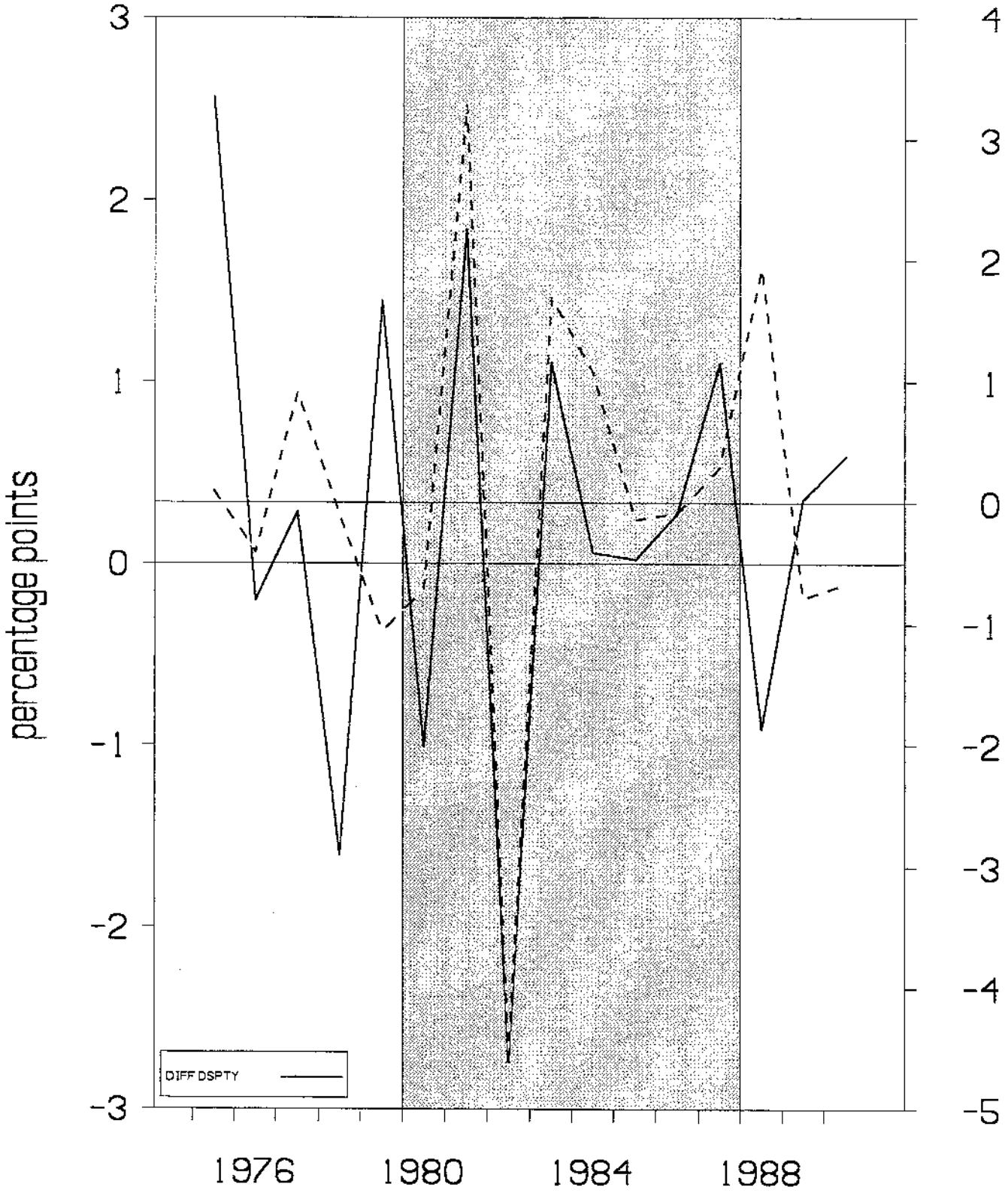

FIGURE 2: FED RGNP forecast errors and the difference in the fiscal disparity.

TABLE 2

Regression Results of
$E_t = a_0 + a_1 (wsdisp)_{t-1} + \epsilon_t$

Dependent Variable: Federal Reserve Staff's errors in forecasting	**NGNP**			**RGNP**			**DEF**		
Sample Period	Constant	wsdisp	R^2	Constant	wsdisp	R^2	Constant	wsdisp	R^2
1970:1-1990:1	-0.084 (-0.140)	-0.376 (-1.430)	.107	-0.161 (-0.335)	-0.003 (-0.013)	.000	0.273 (0.664)	-0.232 (-1.291)	.089
1980:1-1987:1	-2.060 (-1.809)	-2.286 (-2.189)	.444	-1.833 (-2.696)	-2.432 (-3.899)*	.717	-0.843 (-1.585)	-0.343 (-0.703)	.076

Regression Results of
$E_t = a_0 + a_1 (dfwsdisp)_t + \epsilon_t$

Dependent Variable: Federal Reserve Staff's errors in forecasting	**NGNP**			**RGNP**			**DEF**		
Sample Period	Constant	dfwsdisp	R^2	Constant	dfwsdisp	R^2	Constant	dfwsdisp	R^2
1970:1-1990:1	0.306 (0.596)	0.446 (1.216)	.085	-0.115 (-0.329)	0.633 (2.538)*	.287	0.512 (1.403)	-0.050 (-0.194)	.002
1980:1-1987:1	0.342 (0.457)	1.316 (2.367)	.483	-0.013 (-0.044)	1.489 (6.723)**	.883	-0.597 (-1.832)	0.343 (1.415)	.250

Note:

NGNP refers to the errors in forecasting nominal GNP.
RGNP refers to the errors in forecasting real GNP.
DEF refers to the errors in forecasting the GNP Deflator.
wsdisp refers to the fiscal disparity as measured as the difference between the structural deficit in the U.S. relative to potential GNP (PGNP) and a weighted average of the structural deficit of the rest of the G7 countries (RG7) relative to PGNP.
dfwsdisp refers to the change in the fiscal disparity.
t - statistics are in parentheses.
* indicates significance at the .05 level.
** indicates significance at the .01 level.

TABLE 3

Regression Results of
$E_t = a_0 + a_1 (wsdisp)_{t-1} + \epsilon_t$

Dependent Variable: ASA-NBER errors in forecasting	**NGNP**			**RGNP**			**DEF**		
Sample Period	Constant	wsdisp	R^2	Constant	wsdisp	R^2	Constant	wsdisp	R^2
1970:1-1990:1	-0.022 (0.035)	-0.031 (-0.107)	.001	-0.014 (-0.019)	0.319 (0.963)	.047	0.187 (0.893)	-0.244 (-2.548)*	.255
1980:1-1987:1	-2.540 (-2.889)*	-2.518 (-3.121)*	.619	-2.971 (-2.859)*	-2.990 (-3.135)*	.621	-0.041 (-0.082)	0.021 (0.046)	.000

Regression Results of
$E_t = a_0 + a_1 (dfwsdisp)_t + \epsilon_t$

Dependent Variable: ASA-NBER errors in forecasting	**NGNP**			**RGNP**			**DEF**		
Sample Period	Constant	dfwsdisp	R^2	Constant	dfwsdisp	R^2	Constant	dfwsdisp	R^2
1970:1-1990:1	0.119 (0.217)	0.276 (0.819)	.036	-0.152 (-0.242)	0.365 (0.950)	.048	0.383 (2.010)	(-0.015) (-0.129)	.001
1980:1-1987:1	-0.659 (-1.481)	1.570 (4.746)**	.790	-0.736 (-1.375)	1.852 (4.650)**	.783	-0.077 (-0.238)	0.217 (0.905)	.120

Note:

NGNP refers to the errors in forecasting nominal GNP.
RGNP refers to the errors in forecasting real GNP.
DEF refers to the errors in forecasting the GNP Deflator.
wsdisp refers to the fiscal disparity as measured as the difference between the structural deficit in the U.S. relative to potential GNP (PGNP) and a weighted average of the structural deficit of the rest of the G7 countries (RG7) relative to PGNP.
dfwsdisp refers to the change in the fiscal disparity.
t - statistics are in parentheses.
* indicates significance at the .05 level.
** indicates significance at the .01 level.

ability to gauge the *relative* changes in domestic and international policies; that is, to account for the fiscal disparity in policies.

The fiscal disparity seems especially important now given the emphasis on balancing the federal budget. A period of deliberate and sizeable spending cuts in the U.S. relative to the expansionary movement occurring in the rest of the world could be the next period in which the fiscal disparity gap widens, and hence, instigates errors in forecasting. Consequently, further investigation into the accounting and modeling of the fiscal disparity seems warranted. Recognizing the potential economic contribution of the fiscal disparity between nations could prove to be extremely valuable in guiding domestic policy and business decisions as we progress to a global economy.

ENDNOTES

1. Tootell (1997) makes an additional point regarding uncertainty and forecasting. In setting monetary policy, he notes that the more forward-looking is the FOMC, the more uncertainty there is about the accuracy of its forecasts. "Uncertainty around the forecasts, and not just the forecasts themselves, affects monetary policy." (p. 64)
2. For information on the effects arising from policy decisions, see Ambler (1989), Glick and Hutchinson (1990), and Levin (1986). Devereux and Wilson (1989) provide a summary of the research on coordination.
3. The G7 (or Group of 7) includes the world's most industrialized countries and the U.S.' most active trading partners. Besides the U.S., the G7 consists of Japan, France, United Kingdom, Italy, Germany and Canada.
4. At the time that he prepared this publication, John Paulus was the Chief Economist at Morgan Stanley.
5. A basic model detailing the theoretical and empirical foundations is available from the author.
6. Employing cointegration and error-correction techniques, Miller and Russek (1991) empirically confirm that increases in the federal budget deficit "Granger-cause" increases in interest rates. The model here assumes a high degree of capital mobility so that an increase in domestic interest rates will trigger a capital inflow which results in an appreciation of the dollar and a corresponding decrease in net exports.
7. A scanning of the Federal Reserve's "Record of Policy Action" suggests that the Fed staff was not monitoring the concept of fiscal disparity during the 1980s.
8. Changes in the structural deficit are changes in revenue and expenditures that result from changes in tax policy or from changes in discretionary government spending. The structural deficit data may contain revisions from the data originally published. However, given the unavailability of original data, the revised figures serve as the best available data to conduct this test ex-post.
9. Recall that the Paulus quote regarding fiscal disparity described the international policy environment of the 1980's as one in which the U.S. was moving towards expansion while foreign governments were moving toward restraint. The comparative static exercises indicated that the policy maker would tend to overestimate the effects to output and prices from such a fiscal disparity.
10. In 1992, the U.S. joined its international neighbors in recording Gross Domestic Product. The research in this paper utilizes data prior to 1992, however, when Gross National Product was the primary measure of our nation's output.
11. The Fed imposes a five-year delay in releasing forecast data. 1970 is the first year for which annual forecast data are available. The sample was ended at 1990 in order to keep the Fed staff's and ASA-NBER's forecast data sets comparable.
12. These forecasts contain revisions to forecasts that were made prior to the release of the preliminary data. See Karamouzis and Lombra (1989) for details on preparation of Fed forecasts, and Brayton and Mauskopt (1987) for information on the Fed's macro model, the MPS model.
13. The first survey was collected in 1968:4. In 1990, the Federal Reserve Bank (FRB) of Philadelphia began conducting the survey after the ASA and NBER discontinued the survey. The FRB of Philadelphia modified the survey and renamed it *The Survey of Professional Forecasters.* See Croushore (1993) for more information on the survey. The sample period ends in 1990, consequently, to maintain consistency in the forecasts collected.
14. It has been noted that the Fed's forecasts are often based on some assumed stance of monetary policy being followed. Such "conditional" forecasts may not be unbiased.

15. The 1980-87 period was examined because it was a period during which the fiscal policy in the U.S. differed markedly from the rest of the world's. Chow tests of structural stability over this period were rejected at the .05 significance level. The visibly apparent increase, or change, in the fiscal disparity over this period formed the rationale for investigating this relationship.
16. McNees (1992) noted that some time periods have historically been more difficult to predict, and as a result, forecasts were more prone to errors. The period of the early 1980's was cited as one of those difficult periods, as both private and public sector forecasters incorrectly estimated the effects of the 1981-82 recession and its subsequent recovery. These empirical results suggest that the fiscal disparity contributed to those errors in forecasting.
17. When the fiscal disparity variable is disaggregated, neither movements in the structural deficit of the U.S. nor in the RG7 was a statistically significant source of these policy makers' forecast errors, regardless of the sample period examined.

REFERENCES

Ambler, Steve (1989). "The International Transmission of Policy Announcement Effects." Journal of *International Money and Finance,* (June), 219-232.

Brunner, Karl (1985). "The Limits of Economic Policy." *Schweizerische Zeitschrift fur Volkswirtschaft und Statistik,* Heft 3.

Bryant, Ralph C. (1989). "Commentary on Changing Effects of Monetary Policy on Real Economic Activity." *Monetary Policy Issues in the 1990's. A Symposium Sponsored by the Federal Reserve Bank of Kansas City,* (August) 113-127.

Bryant, Ralph C., Henderson, Dale W., Holtham, Gerald, Hooper, Peter, and Steven A. Symansky, Editors (1988). *Empirical Macroeconomics for Interdependent Economies.* The Brookings Institution, Washington, D.C., Volumes 1 and 2.

Croushore, Dean (1996). "Inflation Forecast: How Good Are They?" Federal Reserve Bank of Philadelphia *Business Review,* (May/June), 15-25.

Croushore, Dean (1993). "Introducing: The Survey of Professional Forecasters." Federal Reserve Bank of Philadelphia *Business Review,* (November/December), 3-15.

Devereux, Michael M. and Thomas Wilson (1989). "International Coordination of Macroeconomic Policies: A Review." *Canadian Public Policy,* (Supplement, February), 520-534.

Dornbusch, Rudiger (1980). *Open Economy Macroeconomics.* Basic Books, Inc. Publishers, New York, 173-235.

Frenkel, Jacob A., and Assaf Razin (1987). *Fiscal Policies and the World Economy.* MIT Press, Cambridge, Massachusetts.

Friedman, Benjamin M. (1989). "Changing Effects of Monetary Policy on Real Economic Activity." *Monetary Policy Issues in the 1990's. A Symposium sponsored by the Federal Reserve Bank of Kansas City,* (August), 55-111.

Glick, Reuben and Michael Hutchinson (1990). "Economic Integration and Fiscal Policy Transmission: Implications for Europe in 1992 and Beyond." Federal Reserve Bank of San Francisco *Economic Review,* (Spring), 17-28.

Jordan, Jerry L. (1992). "Private Forecasting and Government Policy Stability." *Cato Journal,* Vol. 12, No. 1, (Spring/Summer), 108-117.

Karamouzis, Nicholas and Raymond E. Lombra (1988). "Forecasts and U.S. Monetary Policy, 1974-78: The Role of Openness." *Journal of Money, Credit and Banking,* Vol. 20, No. 3, (August, Part 1), 402-408.

Levin, Jay H. (1986). "Trade Flow Lags, Monetary and Fiscal Policy, and Exchange Rate Overshooting." *Journal of International Money and Finance,* (December), 485-495.

Lombra, Raymond E. (1993). "The Conduct of U.S. Monetary Policy." *Monetary Policy in Developed Economies, Handbook of Comparative Economic Policies.* Michele Fratianni and Dominick Salvatore, Eds. Greenwood Press, Westport, CT.

McDermott, C. John and Robert F. Westcott (1996). "An Empirical Analysis of Fiscal Adjustments." International Monetary Fund Working Paper 96/59, (June).

McNees, Stephen K. (1995). "An Assessment of the 'Official' Economic Forecasts." Federal Reserve Bank of Boston *New England Economic Review,* (July/August), 13-23.

McNees, Stephen K. (1992). "How Large are Economic Forecast Errors?" Federal Reserve Bank of Boston *New England Economic Review,* (July/August), 25-42.

Miller, Stephen M. and Frank S. Russek (1991). "The Temporal Causality Between Fiscal Deficits and Interest Rates." *Contemporary Policy Issues,* Vol. IX, July, 12-23.

Paulus, John D. (1988). "Global Economic Paralysis: Letting the Dollar Solve America's Overconsumption Problem." *Worldwide Economic Outlook,* Morgan-Stanley, 4-11.

Rivera-Batiz, Francisco L., and Luis Rivera-Batiz (1985). *International Finance and Open Economy Macroeconomics.* Macmillan Publishing Company, New York.

Romer, Christina D. And David H. Romer (1996). "Federal Reserve Private Information and the Behavior of Interest Rates." National Bureau of Economic Research Working Paper 5692, (July).

Tootell, Geoffrey M.B. (1997). "How farsighted is the FOMC?" Federal Reserve Bank of Boston *New England Economic Review,* (January/February), 49-65.

APPENDIX
Forecast Error and Fiscal Disparity Data
Sample period: 1970:1-1990:1

Date	Fiscal Disparity	Difference in the Fiscal Disparity	Federal Reserve Forecast Errors			ASA-NBER Forecast Errors		
			NGNP	RGNP	DEF	NGNP	RGNP	DEF
1970	-7.4040	-2.7284	0.243618	-0.710571	1.192055	-1.951514	-2.531901	0.928217
1971	999	999	2.562465	-0.658773	1.802241	0.320146	-3.383431	2.369634
1972	999	999	2.006721	-0.791522	1.639812	2.556549	-0.152367	1.551440
1973	-1.8093	999	2.125595	-0.873788	3.675756	5.383877	4.060900	1.837523
1974	-2.6992	-0.8899	0.454870	-2.458219	4.624391	-0.872338	-0.238718	0.932531
1975	-0.1318	2.5673	3.017134	0.100851	0.437052	-1.499021	-5.333628	1.799780
1976	-0.3366	-0.2048	-0.285118	-0.411328	0.838626	-1.008510	-0.929690	0.521066
1977	-0.0489	0.2877	1.003870	0.904791	1.489529	1.338145	1.565575	1.116233
1978	-1.6513	-1.6024	3.969225	-0.096544	2.062375	5.540967	2.256858	1.135812
1979	-0.2050	1.4463	-0.779389	-1.054248	1.681687	3.415260	4.352383	0.004248
1980	-1.2112	-1.0062	1.613832	-0.710306	0.759153	-2.858719	-4.706594	0.627770
1981	0.6307	1.8419	-0.187508	3.290567	-0.291397	0.537263	2.132555	1.680865
1982	-2.1103	-2.7410	-5.663093	-4.557822	-2.377388	-5.315794	-5.695499	-0.848112
1983	-1.0015	1.1088	2.840768	1.698157	-0.700007	1.406513	0.804708	-1.221818
1984	-0.9408	0.0608	-0.386607	1.083531	-0.388225	0.985752	2.163715	0.044574
1985	-0.9188	0.0219	-0.662324	-0.128195	-0.724699	0.121639	0.170205	-0.131596
1986	-0.6411	0.2777	-1.765641	-0.074580	-1.289546	-1.422986	-0.535538	-0.402589
1987	0.4681	1.1092	2.363587	0.295187	0.465303	2.334420	1.022127	-0.215172
1988	-0.4400	-0.9081	1.756119	1.936831	0.249015	0.490813	1.268032	-0.329889
1989	-0.0896	0.3505	-0.852775	-0.779521	0.760195	0.040644	0.416568	0.338113
1990	0.5056	0.5952	-1.355839	-0.662513	0.450494	0.027621	1.176604	-0.015819

NOTE: NGNP refers to the errors in forecasting nominal GNP.
RGNP refers to the errors in forecasting real GNP.
DEF refers to the errors in forecasting the GNP Deflator.
999 refers to a missing data value.

THE EFFECT OF AN UNOBSERVABLE MARKET PORTFOLIO ON BIAS IN BETA ESTIMATION: AN EMPIRICAL INVESTIGATION

By J. Austin Murphy*

Since the development of the Capital Asset Pricing Model (CAPM) by Sharpe [25], security betas have been widely employed in financial practice and research. Security betas represent the contribution of an asset to the variance risk of the market portfolio of all risky assets. Betas are employed by diversified investors to compute the relevant risk of an asset or portfolio and are utilized by financial officers and analysts to estimate the required return on investments.[1]

Much has been written about various methods of estimating security betas ([3], [4], [5], [9], [12], [14], [18], [22]). Roll [21], however, has shown that all empirical studies which employ beta estimates may be invalid because the true market portfolio of all assets and its return are not exactly observable. Although Sauer and Murphy [23] have demonstrated a statistical methodology that corrects for the error in measuring the return on the market portfolio, most analysts and researchers continue to use estimation techniques that yield biased beta estimates. This research tests for the statistical significance of the bias in beta estimation.

BETA ESTIMATION PROCEDURES

Defining r as the nominal return on an asset, using italics to symbolize a random variable, and denoting any risky asset with subscript j, the risk-free asset with subscript f, and the market portfolio with subscript m, security betas are defined as

$$(1) \qquad B_j = \mathrm{Cov}(r_j - r_f, r_m - r_f)/\mathrm{Var}(r_m - r_f).$$

Betas in (1) can be estimated empirically by regressing the excess returns of asset j (above the risk-free rate) on the excess returns of the market portfolio

$$(2) \qquad r_j - r_f = a_j + B_j(r_m - r_f) + e_j,$$

where a is the intercept and e is the regression residual. However, the independent variable (the return on the market portfolio in excess of the risk-free rate) in regression equation (2) can not be precisely measured, and so a proxy must be used that is measured with error (Roll [21]). Depending on the method of estimation, errors in the measurement of the value of an independent variable may result in inconsistent parameter estimates that are biased in large samples (Judge et. al. [16]). Although instrumental variables (IV) estimators exist to correct for such bias (Sauer and Murphy [23]), such procedures have largely been ignored for purposes of estimating betas on U.S. stocks (Shanken [24]).

For research purposes, Ordinary Least Squares (OLS) is commonly employed to estimate betas (e.g., Black, Jensen, and Scholes [2]), and, in practice, Bayesian estimation procedures, which are typically used, are based on OLS estimates (Vasicek [28]). More sophisticated procedures have also

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been employed, frequently jointly estimating betas and some other parameter (Gibbons [11]), and attempts have been made to evaluate the effect on testing results of using different proxies for the market portfolio (Stambaugh [26]). Adjustments are also sometimes made to allow for infrequent trading (Dimson [4]) or to allow for betas that vary over time (Lee [18]). However, none of these procedures addresses the problem caused by error in measuring the return on the true market portfolio.[2] Since inconsistent beta estimates caused by errors in variables can distort research and decision-making which are based on such estimates, it is important to determine whether the basic OLS beta estimator is significantly biased.

TESTING BETAS FOR BIAS

Hausman [13] has constructed a test which examines whether a given estimator is significantly different from an IV estimator that is consistent or unbiased in large samples. An IV beta estimator essentially removes the bias in regression equation (2) by multiplying both the dependent and independent variables by an instrument.

An instrument is a variable which should be highly correlated with the true unobservable independent variable but must not be correlated with the vector of differences between the proxy and the true independent variable. Once the appropriate instrument has been specified, the Hausman [13] test merely requires regressing the dependent variable on both the proxied independent variable and the instrument

$$(3) \qquad r_j - r_f = a_{j0} + B_{j1}(r_m - r_f) + B_{j2}INSTRUMENT + e_j,$$

where subscripts are given to the parameters to denote the addition of a second independent variable to equation (2). A t-test which finds the parameter coefficient (B_2) for the instrument to be significantly different from 0 would indicate that OLS is significantly biased, as it implies that the coefficient using the IV estimator would be signficantly different from that utilizing OLS.

The instrumental variable to be used in equation (3) is the 3-group instrument (Johnston [15]). To construct the 3-group instrument, all observations must be ranked into 3 equal-sized groups according to the size of the proxy for the independent variable. Then each observation of the instrumental variable is given a value of 1, 0, and -1 according to whether the observation is in the group with the highest, middle, or lowest values for the proxy, respectively.

According to Kmenta [17], the 3-group instrument has the desirable property of being uncorrelated with the vector of differences between the proxy and the true independent variable as long as there are no cases of the true independent variable having a value that is *less* than two-thirds of its other sample values in the same observation where the proxy value is *greater* than two-thirds of the other sample proxy values, and as long as there are not any independent variable values greater than two-thirds of the other true values in the same observation where the proxy value is less than two thirds of the other proxy values. For beta estimation, this condition merely requires that the vector of differences between the observed proxy return and the true market return not be characterized by large outliers whose signs are opposite that of the return on the true market portfolio. Although this required condition is not extremely restrictive, it does necessitate careful specification of a market portfolio proxy which is highly correlated with the true market portfolio.

In addition, as Theil and van Yzeren [27] have shown, if the proxy has a high correlation with the true independent variable, the 3-group instrument will also be highly correlated with the true independent variable. Thus, the 3-group method has the required properties for an instrument as long as the market proxy is judiciously chosen to have a high correlation with the true independent variable.[3]

The standard proxy for the market portfolio of all assets utilized in both practice as well as in research is the stock market. Galai and Masulis [10] have demonstrated, however, that the proxy should include returns on bonds as well as stocks in order to estimate the return to all productive assets. Friend, Westerfield, and Granito [8] have suggested use of a weighting scheme of approximately 60 percent

equities, 30 percent corporate bonds, and 10 percent T-bonds, which is based on the average security holdings of all U.S. individuals and financial institutions as reported in the Federal Reserve's *Flow of Funds*. Because Black [1], Friend and Blume [7], and Fama and Schwert [6] have provided theoretical justification for not including foreign assets, real estate, and human capital, respectively, into the proxy, it seems justifiable to assume that a portfolio consisting of 60 percent stocks (NYSE value-weighted), 30 percent corporate bonds (investment grade), and 10 percent T-bonds (long-term) would have a high correlation with the true market portfolio.

DATA AND RESULTS

Data on monthly individual stock returns, one-month risk-free T-bill rates, and the return on the various components of the market portfolio proxy are obtained from the monthly returns and index files from the Center for Research in Security Prices (CRSP). All stocks with more than 60 observations on the CRSP tape are included in the sample. For each of these 2463 stocks, the excess returns over all months of listing during the interval 1926-84 are regressed on the excess returns of the market portfolio proxy and the three-group instrument.

The results of the test are shown in Table I. The t-statistics for the instrument are significant for 579 (24 percent), 407 (17 percent), and 207 (8 percent) of the 2463 stocks at the .10, .05, and .01 significance levels, respectively. This large percentage of significant parameter estimates is much greater than the percentage that would exist in a truly random sample (10 percent, 5 percent, and 1 percent, respectively), and t-tests indicate the difference is statistically significant from zero.

Thus, the Hausman test indicates that OLS beta estimates are significantly biased for a large number of stocks, with the implied bias typically being equal to several standard errors of the beta estimate. For instance, the t-statistics indicate that, for about 17 percent of the stocks, the OLS beta estimate is biased by over two standard errors, which implies from prior findings on average beta standard errors [2], that OLS beta estimates are distorted by over 60 percent in such cases).[4]

CONCLUSION

This research shows that traditional econometric procedures based on OLS yield beta estimates which are significantly biased for almost a quarter of all stocks. This finding implies that empirical studies which use OLS betas may be invalid and that decision-making based on such estimates may be distorted.

The results indicate that, to ensure meaningful and valid security beta estimates, it is necessary to employ an IV beta estimator such as the 3-group method.[5] Besides its advantages in terms of estimation efficiency and unbiasedness, the 3-group estimator is also easy to compute.[6]

TABLE 1

Hausman Test Statistics

$$r_j - r_f = a_{j0} + B_{j1}(r_m - r_f) + B_{j2}INSTRUMENT + e_j$$

	Significance Level (1) .10	(2) .05	(3) .01
Number of t-statistics significant for the B2 parameter estimate[a]	579*	407*	207*
Number of t-statistics that would be randomly significant[a]	246	123	25
t-statistic for difference between the number of sample and randomly significant parameter estimates	22.35	26.25	36.75

*Significantly different at the .001 level from the average number that would exist randomly.
[a]Out of 2463 t-statistics computed (one for each of the sample stocks).

ENDNOTES

1. Required returns on any asset are estimated using the CAPM by adding the risk-free rate to a premium for risk that is specified to equal the asset's beta times the amount by which the expected return on the market portfolio of all assets exceeds the risk-free rate. The risk-free rate is often specified as the long-term Treasury bond yield to maturity, and Murphy [19] has suggested estimating the expected return on the market portfolio to be 5% above the risk-free rate (based on historical data).
2. Much of the research on the CAPM focuses on the relationship between asset returns and betas, with the relationship being tested through some form of a regression of a sample of assets' returns on their betas. Researchers recognize the problem that the true CAPM betas are unobservable and must be estimated, and they typically employ a grouping procedure to address the problem of error in variables that exists in the regression of assets' returns on the beta estimates measured with error (Shanken [24]). However, their methodology corrects only for unbiased error in beta estimation, not for the bias in beta estimation that exists.
3. Theil and van Yzeren [27] demonstrated that the 3-group estimator is about 80% as efficient as OLS even if there is no error in measuring the true independent variable. In addition to its econometric efficiency in estimation, the 3-group beta estimator is computationally easy to employ even without statistical software (although many statistical packages also exist to compute IV estimators). In particular, after sorting a time-series set of return observations into three equal groups based on the size of the excess return on the market portfolio proxy, the asset's mean excess returns in the observation group with the lowest excess market returns are subtracted from the mean in the group with the highest returns, and this difference is divided by the corresponding difference in mean excess return on the market portfolio proxy in those two groups (Kmenta [17]).
4. Pastor and Stambaugh [20] have previously shown that error in parameter estimation causes far larger deviations in required return estimates than errors in model specification.
5. Some prior research has already been conducted that utilized instrumental variables to estimate betas. For instance, in a comparative test of the relative power of the CAPM betas in explaining stock returns, Sauer and Murphy [23] used a second market portfolio proxy as an instrument in estimating betas, although they did not test whether their instrumental variables estimator resulted in significantly different beta estimates. Further examination of the issue of bias in beta estimation using other data on other assets over other time intervals and using different market portfolio proxies and instruments is left to future research. It should be mentioned that any new study using more recent data would have to address the issue of the increased integration of the world markets that has occurred in the past 15 years (perhaps by including foreign assets into the market portfolio proxy).
6. See endnote 3.

REFERENCES

F. Black. "International Capital Market Equilibrium with Investment Barriers." *Journal of Financial Economics* 1 (1974), 337-352.

F. Black, M. Jensen, and M. Scholes. "The Capital Asset Pricing Model: Some Empirical Findings." *Studies in the Theory of Capital Markets* ed. by M. Jensen, New York: Praeger (1972), pp. 79-124.

M. Blume. "On the Assessment of Risk." *Journal of Finance* 26 (1971), 1-10.

E. Dimson. "Risk Measurement when Shares are Subject to Infrequent Trading." *Journal of Financial Economics* 12 (1983), 263-278.

F. Fabozzi and J. Francis. "Beta as a Random Coefficient." *Journal of Financial and Quantitative Analysis* 13 (1978), 101-116.

E. Fama and G. Schwert. "Human Capital and Capital Market Equilibrium." *Journal of Financial Economics* 4 (1977), 95-125.

I. Friend and M. Blume. "The Demand for Risky Assets." *American Economic Review* 65 (1975), 900-922.

I. Friend, R. Westerfield, and M. Granito. "New Evidence on the Capital Asset Pricing Model." *Journal of Finance* 33 (1978), 903-920.

P. Frost and J. Savarino. "An Empirical Bayes Approach to Efficient Portfolio Selection." *Journal of Financial and Quantitative Analysis* 21 (1986), 293-305.

D. Galai and R. Masulis. "The Option Pricing Model and the Risk Factor of Stock." Journal of Financial Economics 3 (1976), 53-81.

M. Gibbons. "Multivariate Tests of Financial Models." *Journal of Financial Economics* 10 (1982), 3-27.

J. Hausman. "Specification Tests in Econometrics." *Econometrica* 46 (1978), 1251-1271.

P. Hays and D. Upton. "A Shifting Regimes Approach to the Stationarity of the Market Model Parameters of Individual Securities." *Journal of Financial and Quantitative Analysis* 21 (1986), 307-321.

S. Hochman. "The Beta Coefficient: An Instrumental Variables Approach." *Research in Finance*, ed. by H. Levy, Greenwich: JAI Press, vol. 4 (1983), pp. 123-151.

J. Johnston. *Econometric Methods,* New York: McGraw Hill (1984), pp. 430-431.

G. Judge, C. Hill, W. Griffiths, H. Luetkepohl, and T. Lee. *Introduction to the Theory and Practice of Econometrics,* New York: John Wiley (1982), pp. 531-548.

J. Kmenta. *Elements of Econometrics,* New York: Macmillan (1986), pp. 361-362.

C. Lee. "Market Model Stationarity and Timing of Structural Change." *Financial Review* 20 (1985), 329-342.

A. Murphy. "A Discounted Cash-Flow Model of Convertibles Subject to Multiple Calls in a World of Refunding Costs and Stochastic Interest Rates." *Southern Economic Journal* 56 (1989), 87-104.

L. Pastor and R. Stambaugh. "Costs of Equity and Model Mispricing." *Journal of Finance* 54 (1999), 67-122.

R. Roll. "A Critique of the Asset Pricing Theory's Tests, Part I." *Journal of Financial Economics* 4 (1977), 129-176.

R. Roll and S. Ross. "On the Cross-sectional Relation between Expected Returns and Betas." *Journal of Finance* 49 (1994), 101-121.

A. Sauer and A. Murphy. "An Empirical Comparison of Alternative Models of Capital Asset Pricing in Germany." *Journal of Banking and Finance* 16 (1992), 183-196.

J. Shanken. "On the Estimation of Beta-Pricing Models." *Review of Financial Studies* 5 (1992), 1-33.

W. Sharpe. "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk." *Journal of Finance* 19 (1964), 425-442.

R. Stambaugh. "On the Exclusion of Assets from Tests of the Two-Parameter Model." *Journal of Financial Economics* 10 (1982), 237-268.

H. Theil and J. van Yzeren. "On the Efficiency of Wald's Method of Fitting Straight Lines." *Review of the International Statistical Institute* 24 (1956), 17-26.

O. Vasicek. "A Note on Using Cross-Sectional Information in Bayesian Estimation of Security Betas." *Journal of Finance* 28 (1973), 1233-1239.

THE EFFECTS OF TELEVISION ADVERTISING ON CONCENTRATION: AN UPDATE

Richard T. Rogers* and Robert J. Tokle**

Since the late 1960s, a number of studies have empirically examined the effect of advertising intensity (measured by advertising-to-sales ratios) on concentration change. In comparison to other types of studies that have tested for the effect that advertising may have on competition,[1] these studies have yielded the most consistent results.[2] The advertising intensity coefficients were consistently positive and significant for those studies that used Leading National Advertisers, Inc. (LNA) as their advertising data source.[3] The LNA data, in comparison with other sources of advertising data[4] for a broad segment of the manufacturing industries, provide more accurate advertising expenditures for individual industries (Rogers and Tokle, 1995) and also have the advantage that they can be disaggregated into different media, including network TV, spot TV, network radio, outdoor, magazine and newspaper supplements. However, their major drawback is that it is extremely time consuming to reassign the advertising expenditures to Census industry definitions. For more detail on using LNA advertising data for the 4-digit SIC manufacturing industries and for the 1982 and 1967 LNA advertising data sets, see Rogers and Tokle (1995).

The studies that tested advertising intensity in a concentration change regression model using LNA data at the 4-digit SIC industry-wide level are Mueller and Rogers (1980, 1984) and Tokle, Rogers and Adams (1990). These studies found the advertising intensity coefficient to be positive and significant for many different time periods tested between 1947 and 1982. When total advertising intensity was separated into electronic (network and spot TV plus network radio) and printed[5] (newspaper, outdoor and magazine), the electronic advertising intensity coefficient became larger and more significant, while the printed advertising coefficient became insignificant. Also, for Tokle, Rogers and Adams (1990), network TV advertising intensity was the only medium that by itself was positive and significant. The conclusion reached by these three studies is that television advertising leads to increases in concentration for two primary reasons. First, it is the most effective and persuasive medium in building, and maintaining, product differentiation (Connor et al., 1985). Television advertising features powerful, subjective image-building themes and largely avoids the informational content common in local print advertisements (Resnick and Stern, 1977). Although national magazines advertisements also feature images, television leaves a more dramatic impact on consumers. Most consumer goods that lend themselves to subjective appeals have embraced television as the preferred medium unless denied access by law (e.g., cigarettes after 1972) or by self-imposed industry rules (e.g., hard liquor). Television's proportion of all measured media advertising expenditures has grown from zero in the 1940s prior to the debut of commercial television to over 70 percent by the 1980s (Rogers and Tokle, 1995). The second main reason television has led to increased concentration is the existence of real and pecuniary scale advantages for larger television advertisers. Although the blatant volume discounts in TV advertising were abandoned, they were replaced by a more complex system of purchasing packages of advertising time. Levmore (1978)

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found the newer bargained-for rates still contained substantial volume discounts.[6] Scala (1973) found large advertisers secured more favorable times slots (e.g., prime time) than smaller advertisers. The combination of volume discounts and preferred times combine to disadvantaging the smaller advertiser.

TELEVISION-TO-TOTAL ADVERTISING AND CONCENTRATION CHANGE

Leahy (1988), using an approach similar to Lynk (1981), developed a concentration change model where the proportion of television advertising to total advertising expenditures (TV), rather than advertising intensity, was the key independent variable. As Leahy argued, the effect of TV on concentration change could be positive or negative. TV was a two-tailed test because on the one hand the "large-firm effect" says that "the most efficient firms have the greatest incentive to advertise and these firms will tend to grow larger than the less efficient firms" (Leahy, 1988, p. 23). On the other hand, the "entry-effect" says that "advertising facilitates entry into an industry and entering firms tend to be smaller than existing competitors" (Leahy, 1988, p. 23). This would tend to decrease concentration. Leahy also shows that this approach avoids the simultaneous equation problem of advertising and concentration studies and possibly the consumer information problem.[7]

Leahy's work (1988, 1989, and 1997) covered various periods from 1947 to 1987. Table 1 shows the regression results from these three studies for the equations that used the change in four-firm concentration as the dependent variable. TV is the ratio of television-to-total advertising for 1967 in all equations estimated. CR is initial concentration of the time period, GR is industry growth over the time period (measured by change in value-added) and S is industry size (measured by the natural logarithm of value-added in beginning time period). CR, GR and S are hypothesized to have negative coefficients (see Leahy, 1988 and 1989). Industry concentration ratios and value-added came from the U.S. Census of Manufactures.

TABLE 1

Leahy's Results of Four-Firm Concentration Change Model

STUDY	1988		1989	1997	
Time Period	1947-67	1947-72	1947-77	1947-82	1947-87
TV	.081 (2.59)**	.066 (1.75)	.114 (2.59)**	.14 (2.65)**	.11 (1.77)
CR	-.177 (-3.43)**	-.199 (-3.24)**	-.202 (-2.61)**	-.29 (-3.19)**	-.34 (-3.12)**
GR	-.003 (-2.66)**	-.002 (-1.03)	-.007 (-2.92)**	-.004 (-1.54)	-.0006 (-.49)
S	– –	– –	-.038 (-2.42)**	-.04 (-2.10)*	-.03 (-1.57)
N	77	74	69	62	57

t-ratios are in parentheses.
TV is a 2-tailed test and CR, GR and S are 1-tailed tests.
*Significant at the 5 percent confidence level.
**Significant at the 1 percent confidence level.

As can be seen in Table 1, CR is always negative and significant, while GR and S are always negative, but are not always significant. TV is always positive, but its statistical significance varies between 1 and 10 percent. Leahy (1997, p. 46) concludes "that the large-firm effect of advertising on concentration continues to outweigh the entry effect."

Tokle (1995) added to Leahy's 1988 and 1989 work. First, the time period began in 1967, rather than 1947, because the last major reclassification of the SIC was in 1963. By starting in 1967, 237 industries were available to use in the sample for the 1967-87 regression equations, compared to 57 for Leahy (1947-87). Also, Tokle used LNA advertising data from 1967 and 1982, which may yield a more accurate measure of advertising than for one year (Tokle, Rogers, and Adams, 1990, pp. 7-8).

Tokle's results appear in Table 2. The model is identical to Leahy's (1989), except TV67 and TV82 are television-to-total advertising for 1967 and 1982, respectively, while TV (AVE67,82) is the average of TV67 and TV82. Also, GR is treated as a two-tailed test (see Tokle, 1995, p. 39). CR and S are always negative and significant, while GR is negative and significant for the 1967-82 period. TV, whether measured from 1967, 1982, or an average of the two years, is positive and significant in all equations. Tokle concludes that there are two possible interpretations of TV. One is that the "large-firm effect" dominates the "entry effect." Another is that television advertising "is the most effective medium to build product differentiation and create barriers to entry" (p. 42).

The purpose of this paper, in addition to the review of these four concentration change and television-to-total advertising studies, is to update Leahy's model to include the most recent Census year, 1992. This may well be the last possible period for a concentration change study, since the U.S. Census of Manufacturers does not plan to compile industry concentration ratios beyond the 1992 Census.

Empirical Results

The linear regression model used is Leahy's 1989 model:

$$\Delta CR = a_0 + a_1 TV + a_2 CR + a_3 GR + a_4 S + u$$

where ΔCR is four-firm concentration change (at the SIC four digit-level), and TV (the ratio of television advertising to total advertising), CR (the initial year's concentration ratio), and GR (industry growth over the period) and S (industry size) are as measured in Tokle (1995). For the economic hypotheses associated with these variables, see Leahy (1988) and Tokle (1995).

Out of 450 SIC four-digit manufacturing industries in 1982, this study has a sample size of 217 industries. Most of the industries excluded were due to: (1) SIC industry definitional changes between 1967 and 1992, (2) "not elsewhere classified" groupings, which do not comprise a meaningful market, and (3) lack of four-firm concentration ratios due to disclosure.

The regression results from the 1967 to 1992 period are shown in the first three equations in Table 3. CR, as consistently shown in these past studies by Leahy and Tokle, is negative and statistically significant. This is because "leading firms in concentrated industries are likely to lose market share over time. In addition, the higher the original level of concentration in the industry, the smaller is the maximum possible increase over the period" (Leahy, 1988, p. 23). Also, unconcentrated industries tend to show increased concentration over time. S is also negative and significant, as it was in these past studies, except for the 1947-87 period for Leahy (1997). Larger industries have room for more optimal-sized firms, resulting in lower concentration (Tokle, Rogers and Adams, 1990), but also smaller industries tend to concentrate. GR, on the other hand, is insignificant here, similar to the GR coefficient for the 1967-87 period for Tokle (1995) and some of Leahy's estimated equations. Growth may have had a deconcentrating effect earlier, but it appears to have worn off by sometime in the 1980s.

TABLE 2

Tokle's Results of Four-Firm Concentration Change Model

STUDY	1995					
Time Period	1967-82			1967-87		
TV67	7.02 (3.60)**			7.57 (2.88)**		
TV82		5.32 (3.39)**			4.89 (2.34)*	
TV(AVE67,82)			7.67 (3.94)**			7.74 (2.94)**
CR	-.13 (-4.84)**	-.13 (-4.71)**	-.13 (-4.93)**	-.14 (-3.94)**	-.14 (-3.75)**	-.14 (-3.97)**
GR	-.89 (-2.99)**	-.95 (-3.18)**	-.95 (-3.20)**	-.17 (-.56)	-.19 (-.62)	-.21 (-.72)
S	-1.72 (-3.28)**	-1.93 (-3.57)**	-1.95 (-3.66)**	-1.69 (-2.33)**	-1.82 (-2.45)**	-1.88 (-2.55)**
N	280	280	280	237	237	237

t-ratios are in parentheses.
TV and GR are 2-tailed tests and CR and S are 1-tailed tests.
* Significant at the 5 percent confidence level.
** Significant at the 1 percent confidence level.

TABLE 3

Regression Results of Four-Firm Concentration Change

TIME PERIOD	1967-92			1982-92
Intercept	28.5	28.3	28.9	21.2
TV67	8.26 (2.56)*			
TV82		3.08 (1.21)		0.90 (0.49)
TV(AVE67,82)			6.72 (2.07)*	
CR	-.19 (-4.28)**	-.17 (-3.95)**	-.18 (-4.15)**	-.09 (-2.81)**
GR	-.41 (-1.74)	-.37 (-1.52)	-.41 (-1.72)	.05 (.04)
S	-2.73 (-3.07)**	-2.74 (-3.00)**	-2.85 (-3.15)**	-2.07 (-3.39)**
R^2	.13	.11	.12	.06
N	217	217	217	217

t-ratios are in parentheses.
TV and GR are 2-tailed tests and CR and S are 1-tailed tests.
* Significant at the 5 percent confidence level.
** Significant at the 1 percent confidence level.

As with Leahy (1988, 1989, and 1997) and Tokle (1995), TV (television-to-total advertising expenditures) is the main focus of this study. Similar to Tokle (1995), this study tests TV as 1967 (TV67), 1982 (TV82), and as an average of 1967 and 1982 [TV(AVE67,82)]. Table 3 shows TV to be positive and significant at the 5 percent level for TV67 and TV(AVE67,82) during the time period 1967-92. Again, there exist two possible interpretations of this. The first, suggested by Leahy, is that the "large-firm effect" dominates. The second, offered as a possible alternative by Tokle (1995), is that TV tends to increase concentration because television is the most effective medium to build product differentiation (a barrier to entry). However, unlike the 1967-82 and 1967-87 periods reported by Tokle (1995), TV82 becomes insignificant for the 1967-92 period. The level of significance also drops for TV67 and TV(AVE67,82) for 1967-92, compared to 1967-82 and 1967-87. The last equation in Table 3 reports the estimated model for a later and shorter time period: 1982-92. Here, the estimated coefficient for TV82 is very small and insignificant. Overall, the last ten-year period does not show much structural change.

In comparing the results of 1967-92 and 1982-92 and those of 1967-82 and 1967-87, it appears that the effect of television-to-total advertising on concentration change may be nearly exhausted, whether measured as TV67, TV(AVE67,82), or especially as TV82.[8] Network television advertising began in 1951 (Brooks and Marsh, 1981), but "there has not been much change in the structure of network television since the mid-1950's" (Leahy, 1997, p. 45). This could have caused a disequilibrium in the industrial market structures, allowing for industries that used more television advertising to increase in concentration. But, as television advertising matured, these industries may be reaching a new equilibrium with respect to concentration and type of media used to advertise.

An examination of the actual level of concentration in each year (Table 4) reveals that the average level of concentration was positively related to the measured-media advertising-to-sales ratio (using 1967 data). Of the 217 industries, 83 did no media advertising in 1967 and had a mean CR4 of 37.6. In contrast, the 22 industries with the highest advertising intensity in 1967 had a mean CR4 of 54.0 in 1967. The low advertisers had concentration levels similar to the non-advertisers and the moderate advertisers had average CR4s between the two extremes. Whereas the non-advertising and the low and moderate users of advertising showed little change in concentration over the 1967 to 1992 period, the highest users of advertising posted a consistent rise in mean CR4, from 54 in 1967 to 61.6 in 1992. So both the level and change in concentration are related to advertising intensity. But, as the results suggest, a higher level of concentration may be the new equilibrium level.

TABLE 4

Mean Four-Firm Concentration, by Year, by Degree of Advertising Intensity for 217 Manufacturing Industries, 1967 to 1992

Year	None N=83	Low N=80	Moderate N=32	High N=22
1992	38.7	39.6	51.5	61.6
1987	38.0	38.2	51.3	60.6
1982	37.8	35.8	51.6	57.5
1977	37.9	36.6	51.6	56.5
1972	37.8	37.6	51.0	55.4
1967	37.6	37.1	49.8	54.0
Change 1967-1992	+1.1	+2.5	+1.7	+7.6

Advertising intensity was defined by the 1967 measured media advertising-to-sales ratio (TAS67, measured as a percent) as follows: none if TAS67 = 0; low if $0 < TAS67 \leq 0.5$; moderate if $.5 < TAS67 \leq 2.5$; high if $TAS67 > 2.5$.

SOURCE: U.S. Bureau of the Census, *Concentration Ratios in Manufacturing*, 1992 (and earlier), Census of Manufacturers and the advertising data are from Rogers and Tokle.

CONCLUSION

Overall, the results of these past studies show that media advertising, especially network television, was associated with increased industry concentration. The introduction of television advertising disrupted existing market structures and over time the industries that could use television advertising the most effectively exhibited the largest increases in concentration. Although many critics of capitalism feared capital-intensive industries would become highly concentrated, their concentration levels have remained at levels consistent with workable competition (CR4 less than 40) or even declined over time (Mueller and Rogers, 1980). On the other hand, consumer goods industries that found television advertising a valuable marketing tool increased in concentration and as a group have the highest average concentration level. The concentrating effect of television advertising, however, appears to have been exhausted as we moved into the 1980s and 1990s.

ENDNOTES

1. Most of these other studies have focused on the connection between advertising intensity and either concentration levels or profit rates.
2. For a survey of these advertising intensity and concentration change studies, see Tokle, 1993.
3. LNA is now Competitive Media Reporting.
4. Such as advertising expenditures taken from the Input-Output Tables.
5. Printed advertising contained outdoor and magazine for Tokle, Rogers and Adams (1990).
6. See Connor et al., 1985, pp. 95-97 for a complete discussion.
7. See Leahy, pp. 21-23, for a discussion on how his model may avoid these two problems.
8. Recall that in Leahy's results, the significance of TV fell from 1 percent to 10 percent from the 1947-82 to the 1947-87 period. This could also indicate that the effect of television advertising on concentration change was waning.

REFERENCES

Brooks, Tim and Earle Marsh. *The Complete Directory to Prime Time Network TV Shows: 1946-Present.* New York: Ballantine Books, 1981.

Connor, John M., Richard T. Rogers, Bruce W. Marion, and Willard F. Mueller. *The Food Manufacturing Industries, Structure, Strategies, Performance, and Policies.* Lexington, Massachusetts: Lexington Books, D. C. Heath and Company, 1985.

Leahy, Arthur S. "The Effects of Television Advertising on Concentration." *New York Economic Review* 18(Fall 1988):21-42.

Leahy, Arthur S. "The Effects of Television Advertising on Concentration: Further Evidence." *New York Economic Review* 19(Spring 1989):46-50.

Leahy, Arthur S. "The Effects of Television Advertising on Concentration: An Update." *New York Economic Review* 28(Fall 1997):45-58.

Levmore, Saul. "Small Firm Disadvantages in Television Advertising." Unpublished Ph.D. dissertation, Yale University, New Haven, Connecticut, 1978.

Lynk, W. J. "Information, Advertising, and the Structure of the Market." *Journal of Business* 54(April 1981):271-303.

Mueller, Willard F., and Richard T. Rogers. "The Role of Advertising in Changing Concentration of Manufacturing Industries." *The Review of Economics and Statistics* 57(1)(February 1980):89-96.

Mueller, Willard F., and Richard T. Rogers. "Changes in Market Concentration of Manufacturing Industries, 1947-1977." *Review of Industrial Organization* 1(Spring 1984):1-14.

Resnick, A. and B. Stern. "An Analysis of Information Content in Television Advertising." *Journal of Marketing* 41:50-53, 1977.

Rogers, Richard T. and Robert J. Tokle. "The Economics of Advertising: Where's the Data?" *Review of Industrial Organization* 10(1995):675-687.

Scala, James R. "Advertising and Shared Monopoly in Consumer Goods Industries." *Columbia J. L. & Soc. Probs.* 9:241-278, 1973.

Tokle, Robert J., Richard T. Rogers, and Jean W. Adams. "Advertising Intensity and Concentration Change in Manufacturing Industries, 1967 to 1982." *Midwestern Journal of Business and Economics* 5(Spring 1990):1-14.

Tokle, Robert. "Advertising Intensity and Concentration Change." *New York Economic Review* 24(Fall 1993):35-44.

Tokle, Robert. "The Effects of Television Advertising on Concentration: Further Evidence on Leahy's Work." *New York Economic Review* 26(Fall 1995):38-44.

SOCIOBIOLOGY AND ECONOMICS: A REVIEW OF THE LITERATURE

Ahmet Baytas*

I. INTRODUCTION

Are human beings cooperative and altruistic, or are they intrinsically selfish and competitive? Is the choice this clear cut? At least three interrelated developments have led to renewed debate on these age old questions. First, recent research in evolutionary biology has suggested—more strongly than ever before—that comparisons between humans and other species are possible and has cast new light on the issue of human altruism. Moreover, in the past couple of decades a remarkable communication has developed between economists and sociobiologists, who are using each other's theories and techniques, and coming to similar conclusions about human nature. This is not a coincidence; the revival of the Darwinian evolutionary theory as applied to problems of social behavior, known as sociobiology, has a distinctly economic aspect [Hirshleifer 1977]. Secondly, empirical evidence in both behavioral sciences and field biology has shown that "rationality" and "selfishness," at least in the narrow sense, are not as rampant as mainstream economics might have expected. Trust and cooperation seem to be part of both human and animal life. Lastly, while the critique of self-interest theory is still a minority position within the economics discipline, it has finally found its voice. A large number of studies on the issue of altruism in the last three decades undoubtedly signify a strong interest in non-selfish economics. For example, Collard [1968], in defending his thesis that even in economic dealings people are not entirely selfish, claimed that "private markets are unable to deal with situations where altruism is important"; Sen [1979 and 1987] hinted at the irrelevance of utility theory and its emphasis on self-interest maximization; Etzioni [1988] pointed out the missing "moral dimension" in standard economics, and criticized the egoism of the public choice theory associated with James Buchanan; Greg and Paul Davidson [1988] stressed the importance of "civic values"; Frank [1988] asked, "is selfishness the only rational basis for action?"; Kohn [1990] emphasized the brighter nature of human beings; Piore [1995] argued that the self-interested individual is "an inadequate social theory for addressing many contemporary issues"; and Elster [1998] discussed the features of emotion that might be relevant for economists.

This paper attempts to review the recent literature on the convergence of ideas between evolutionary biology and economics and focuses on how sociobiology has added to our understanding of rational choice theory and has affected the nature of individual utility functions. In section two, the similarities between economics and biology are discussed and the basic principles of sociobiology are introduced. In section three, the evidence from the recent free-rider experiments and behavioral evidence on altruism are presented. Finally, in section four, biological explanations of altruism, such as the models of kin selection and reciprocal altruism, are described. Other evolutionary explanations, including those provided by Robert Frank, Herbert Simon and Jack Hirshleifer, are also discussed.[1]

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II. THE EVOLUTIONARY THEORY AND ECONOMICS

1. Economics and Biology

Researchers in various fields have increasingly been using evolutionary arguments to explain various behavioral traits in humans. Hirshleifer [1978, 1987, 1994 and 1995] has used them to explain economic behavior under adversity as well as to understand when and why humans resort to anarchy and warfare. Alan Rogers [1994], an anthropologist, has argued that human time preferences are determined by the tradeoff between reproduction and longevity, implying that long-term interest rates can be predicted from human biology.[2] Bergstrom and Stark [1993] have maintained that evolutionary theory can be used to explain human behavior, since fundamentals of mating, child-rearing, and sibling relations have remained stable over long periods. Becker [1974; 1976; 1981 and 1991] has explored evolutionary theories of altruism in the economics of the family. A large literature on intergenerational models has followed Barro's [1974] reformulation of the Ricardian equivalence theorem. While economists borrowed concepts from evolutionary biology to help analyze the emergence of cooperation among people, biologists used economic models in studies of social behavior in animals, such as optimal foraging and investment in offspring. This recent interaction between biology and economics should not be surprising, since as Tullock [1977] remarked, Darwin stated that his discovery of evolution was a result of reading Malthus's *On Population.* Hirshleifer [1978], too, observed that Adam Smith based the division of labor upon a biological instinct to exchange, while Alfred Marshall declared economics "a branch of biology."

It is not difficult to see that fundamental concepts like scarcity, competition, division of labor and equilibrium play similar roles in economics and biology. Also, the common ground between the two disciplines is clearly a focus on the individual. Individual behavior is analyzed within a utility-maximizing framework in economics, while biologists study it in terms of maximizing genetic fitness. The process of "optimizing" in economics is nothing but "adapting" in biology, choosing strategies that promote success in a competitive environment. The biologist M. Ghiselin [1978] argues that economics *(political economy)* and biology *(natural economy)* have more than just a few lessons to learn from each other, because, together they constitute a branch of knowledge that may be called *general economy.* Hirshleifer [1977] goes even further by suggesting that all social sciences, including economics, devoted to the study of man are subdivisions of the "all-encompassing field of sociobiology."

The last time biology and economics were this closely engaged was in the Social Darwinism of Herbert Spencer. The precedent is not encouraging. Social Darwinism concentrated on supposed genetic differences among individuals and races, and provided justification for racism, fascism and eugenics. Not surprisingly, many critics (e.g., Allen [1975]) see in modern sociobiology another potentially disturbing genetic approach to human nature with similar reactionary political implications. They view the product of cooperation between economists and biologists as mere justification of the self-interest paradigm, in which genuine altruism is ruled out of existence. Others (e.g., Goldfarb and Griffith [1991]) try to convince us that this time there is no need to worry, since, where the two disciplines have come together, a more benign view of human nature has emerged. They argue that economics and evolutionary biology both focus on the similarities among individuals of all races, the fact that humans of all colors and creeds are motivated by the same preferences, desires and goals—to accumulate the means to consume and to have children. They also point out that nowadays the obsession is not with struggle but with cooperation, and that while Social Darwinists used a conception of natural competition to justify laissez-faire capitalism, contemporary biologists try to show how selfishness and competition can lead to cooperation and how the collective interest can be served by the pursuit of self-interest.

2. Modern Sociobiology

It was the revival of interest in Darwinian evolution in the mid-1960s and the publication of two books about a decade later, Wilson's [1975] massive volume on sociobiology and Dawkins' [1976] classic study

on the notion of the selfish gene, that excited many people in economics and biology by providing the biological basis of human behavior. Becker [1976] soon asserted that "both economics and sociobiology would gain from combining the analytical techniques of economists with the techniques in population genetics and other biological foundations of sociobiology."

The key elements of modern genetics which help us understand sociobiologists' evolutionary approach are the following.[3] All organisms have genes (DNA). Within a species, many genes are present in two or more alternative forms or *alleles.* Different alleles provide somewhat different influences on the development of individuals, contributing to variation in the characteristics of the members of a species. Since no population can grow forever, the number of copies each gene can make in a population is limited. Therefore, there will be competition among the alleles of a gene to occupy the limited number of spaces in a gene pool. If one allele can make more surviving copies of itself than another allele over a period of time, it will eventually replace the alternative form within the population. This process whereby the originally random and accidental genetic changes are either selected for or selected against is natural selection. For many evolutionary biologists, life is basically a contest among different alleles to survive and replace alternative forms. As Dawkins [1976] wrote, the fundamental brute force in nature is the selfishness of the gene: "an organism is DNA's way of making more DNA." Obviously, the most common way for individuals to propagate their genes is to pass them on to their offspring through reproduction. Evolutionists assume every act of an organism in some way helps to maximize the individual's reproductive success, referred to as its *genetic fitness,* as measured by the number of offspring that carry its genes. An inherited characteristic can become more widespread and survive if it enhances the fitness of the individuals who carry it.

III. THE EVIDENCE ON ALTRUISTIC BEHAVIOR

The great strength of the assumption of self-interest in neoclassical theory is that it can be worked into social harmony. Each person unconsciously promotes the common good by pursuing his own narrow self-interest.[4] But the failure of self-interest to lead to desirable outcomes in some situations—namely the public goods problem in which individual incentives may be at odds with group interest—has long been acknowledged. While Olson [1965] recognized it as a problem of "collective action", and Hardin [1968] as the "tragedy of the commons," social psychologists called it a "social dilemma."

For researchers, social dilemmas provide nearly ideal conditions in which human and animal behavior can be better understood. This is evidenced by the fact that during the last two decades variations of the prisoner's dilemma have been the subject of continuous experimental and theoretical interest. Much of the economic and biological literature has focused on the game between two prisoners formulated in 1950 by Tucker (see Roth 1995).[5] In this game, each player has two choices, cooperate (deny the crime) or defect (confess to the crime). The dilemma is that, if both players defect, each receives a lower payoff than if they had cooperated.

We encounter many prisoner's dilemmas each day, from traffic jams to price wars in an oligopoly, in which individual rationality and narrow self-interest do not lead to the best outcome.[6] For example, during heat waves, electricity will be available for basic needs if users postpone turning on their air conditioners—otherwise, the result could be a power outage. In standard economics, pursuit of narrow self-interest would lead individuals to follow the noncooperative strategy. But the recent experimental literature suggests that players often (though not always) behave cooperatively in finitely repeated or even one-shot prisoner's dilemmas.

Although for decades most economists believed that voluntary contribution mechanisms would provide few, if any, public goods due to the free rider problem, experimental data suggest otherwise. The earliest experimental work cited in the literature is by Bohm [1972], which provided evidence against the standard assumption that subjects would free ride. Many later studies used the same general design of presenting subjects with some public good whose value to them was unknown to the experimenter and of

comparing the results of different methods of eliciting their willingness to pay. The major empirical findings are summarized in Ledyard [1995], who looks at six such experiments. These six experiments were structured as a multi-person prisoner's dilemma game where a zero contribution is in everyone's narrow self-interest. Remember that game theory predicts that rational egoists playing the prisoner's dilemma game once will both choose their dominant strategy, defection, and each will get a reduced payoff. In theory, if the game is played a known finite number of times, the players still have no incentive to cooperate.[7] But in all six studies subjects contribute at least some amount even under conditions in which noncontribution is a dominant strategy. Specifically, three of these studies suggest that individuals are not as selfish as generally assumed, while the others establish that altruism occurs but has much less staying power than the first three experiments might have indicated.

There have been a large number of other experiments which indicate that people do not seem to act primarily as self-interested maximizers. For instance, in one of Melvin Lerner's several studies, cited in Kohn [1990], subjects who were asked to volunteer for another study and to contribute a portion of the payment they would receive to a needy family signed up for more sessions than did those who were not asked for a contribution. Experiments cited by Etzioni [1988] show that many individuals mail back "lost" wallets to strangers, cash intact. In one study, nearly two-thirds of the subjects who had an opportunity to return a lost contribution to an "Institute for Research in Medicine" did so—by paying for postage. Kohn [1990] draws from *hundreds* of compelling studies in psychology, sociology and economics to demonstrate that humans are much more caring than they give themselves credit for, and that their generosity cannot be reduced to mere self-interest.

It must be added that experiment design can significantly affect the level of cooperation observed. For example, in virtually all experiments, small group size is found to encourage altruistic behavior. This is consistent with the commonly held belief that prosocial behaviors are less common in big cities.[8] How are we to interpret this observation? Kohn [1990] argues that "theorists steeped in the egoistic premises of social science" have concluded that if people in smaller towns are more helpful it must be because they know their kindness (or unkindness) is likely to be reciprocated. He instead asserts that the fact that one knows the other residents of a small town simply makes their humanness harder to avoid. Kohn is suggesting that it may be appropriate to turn the usual argument on its head, that we should begin with the assumption that the default condition of humans is a tendency to empathize, sympathize, and help. To quote Collard [1978], "it is not that selfish men sometimes appear to behave unselfishly, but that unselfish men sometimes appear to behave selfishly."

Another particularly interesting finding is the impact of repetition on cooperation rates. When subjects faced the same decisions repeatedly, the relatively high initial contribution rate to public goods was found to decline.[9] It is still not clear why this is so. Are subjects learning? Or is it an attempt to punish "unfair" behavior by others? Perhaps this decline with repetition is the result of rather complicated strategic decisions and/or attempts at signaling.

A growing number of recent studies have combined computer simulations that can create and explore theoretical models with experiments that are useful for observing behavior [Roth 1995]. The best known work of this genre is Axelrod's [1984] *The Emergence of Cooperation,* which is based on a pair of computer tournaments. In the first one, Axelrod invited scholars in various fields familiar with the prisoner's dilemma to submit computer programs encoding a strategy to play the repeated game. He then ran the fourteen entries and a random rule against each other in a round robin tournament. Each program could use the history of the game in deciding whether to cooperate on the current move. The strategy with the highest cumulative payoff was tit-for-tat, which starts with cooperation and thereafter echoes the other player's previous move.[10] In the second round, where the game was repeated with a fixed probability of continuation after each round (with p=0.99), tit-for-tat was again the winner among sixteen new entries, implying again that behavior will eventually converge to cooperation. Interestingly, tit-for-tat and all of the other successful rules were "nice" in the sense that they did not defect first.

In summary, typical experiments reported a level of cooperation that responded readily to various kinds of experimental manipulation but that was bounded well away from either zero or 100 percent. Ledyard [1995] sums it up by stating that the public goods problem is not as bad as neoclassical theory makes it to be, adding that "even the most fervent economic experimentalist cannot force rates of contribution much below 10 percent." Nevertheless, many disagreements and questions remain as contemporary discussion proceeds on both theoretical and experimental lines.

In addition to the experimental literature, a huge body of behavioral evidence provides many exceptions to the notion that people are selfish and tend to free-ride. People regularly contribute to public television and radio stations. They tip waiters in restaurants they will never visit again. They vote in elections and save for future generations. Everyday people go out of their way to return lost wallets to their owners. People donate blood and give gifts [Titmuss 1971]. In a recent paper that focuses on donations of money and time to organizations, Rose-Ackerman [1996] reports that in 1990 total monetary contributions in the U.S. were estimated to be $122.6 billion, of which $109.6 billion was personal giving. Similarly, in 1993 the value of volunteer labor provided to charitable organizations was just over $182 billion. Psychological studies of helping behavior confirm the importance of altruism in everyday life; and research with children shows many unprompted acts of sharing, helping, or comforting. [Kohn 1990].

People regularly help victims of natural disasters [De Alessi 1975]. Quarantelli and Dynes [1976] found looting and violence to be rare and helping behavior towards victims common. Kunreuther and Dacy [1969] note that after the Alaskan earthquake of 1964, prices of many goods were either unchanged or actually lower, and that during the floods in 1953 in the Netherlands, refugees received shelter in private homes at little or no charge.

Frank [1996] recently argued that unselfish motives also figure prominently in the labor market. Based on his analysis of Cornell University's career center employment survey of recent graduates as well as a number of surveys conducted by others, he claimed that "even crude measures of moral satisfaction on the job do more to explain wage differences than do the human capital variables traditionally used for this purpose." Frank observes that one dimension in which jobs differ from each other is the degree to which the worker contributes to the well-being of others.[11] Consider two jobs identical in all respects except this one. Using conventional labor market analysis, it can readily be shown that if people get satisfaction from engaging in altruistic behavior, in equilibrium we would observe a compensating wage-premium for the less altruistic job. The data do in fact show a strong negative correlation between annual earnings and the degree to which an employer and/or occupation is viewed as being "socially responsible." For example, in 1990 the average starting salary for an attorney for the New York ACLU was barely $28,000, as compared with an average starting salary for attorneys in a sample of large New York law firms of $83,000. Frank also reports results of a survey of a sample of Cornell University graduating class who stated that they would require large compensating wage-premiums before being willing to switch to a less socially responsible employer.[12]

IV. EXPLANATIONS OF ALTRUISM

1. Biological Explanations

A. Group Selection. Until the mid-1960s, when Williams [1966] published his influential book, *Adaptation and Natural Selection,* biologists generally believed natural selection operated at the group level, i.e., favored characteristics that benefit the species as a whole. In this view, individuals often act in ways that contribute to the survival of the group, rather than that advance their own narrow self-interest. For example, when food is scarce and overpopulation threatens the group, predators like snowy and great gray owls restrict their own breeding; individual birds of many species give warning signals that help the group but may endanger themselves, and so on.

One way to understand group selection is to consider a biologist's (Smith [1972]) description of the evolution of fighting among male deer during the breeding season. Since victory increases genetic fitness, why has natural selection favored *branched* antlers, whose structure reduces a stag's chances of winning fights and generally prevents him from being seriously injured by his rival's antlers? Wouldn't it be more effective to wait until an opponent's back was turned and charge him in the flank?[13] This behavior, however, while favoring the individual, may be bad for the survival of the group or species as a whole. Thus, in such situations there is a conflict between group selection and individual selection—a classic case of a "social dilemma." The group selection model suggests that conventional methods of fighting have evolved because they reduce the risk of injury to individuals, i.e., they are good for the species as a whole. However, in a game theoretic context where the optimal strategy for an individual depends on the strategies adopted by others, Smith shows that no strategy would pay better (in terms of fitness) than the one in which members of a population fight conventionally but escalate if their opponent escalates. If a population adopts this strategy, the behavior would persist and departures from it would be eliminated by selection. In short, individual selection can account for the evolution of such behavior patterns that minimize injury; there is no need to invoke group selection.

So group altruism, which Samuelson [1993] called a "teleological explanation of altruism as needing to evolve lest the species become extinct," is now largely discarded by biologists. In order to account for the manifest existence of altruism, which Wilson [1975] declared to be "the central theoretical problem of sociobiology," evolutionary biologists have built models of kin selection and reciprocal altruism.

B. Kin Selection. The modern sociobiological theory of altruism was launched by Hamilton's [1964] "kin selection" model in which the central concept is "inclusive fitness." As in all biological models, an individual is regarded an altruist if his behavior increases the fitness of another individual at the expense of his own fitness. Hamilton observed that when an individual animal performs an altruistic act toward, say, a brother, the inclusive fitness is the fitness of the altruist (which is now lower as a result of the act) *plus* the increment in fitness enjoyed by that portion of the brother's genes that is shared with the altruist. In general, the kin selection model suggests that if the altruist lowers his fitness by x units as a result of his act and increases his brother's fitness by y units, since they have one half of their genes in common, his altruism will increase his (inclusive) fitness if $y>2x$.[14]

The classic examples of kin selection involve social insects, which curtail their own reproduction in order to enhance the chance of survival of their fertile siblings. This is because the workers are more closely related to their sisters than any offspring which they might produce themselves—sisters share on average three-quarters of their genes, but a worker's offspring would only inherit one-half of them. Thus, more of the worker's genes will be represented in the next generation if, rather than raise her own young, she instead raises those of her own mother.

Is an individual who promotes his or her own genetic future by making sacrifices on behalf of others who carry copies of his or her genes genuinely altruistic? Many observers have noted that behavior explained by the kin selection model is not true altruism because the individual making the sacrifice actually gains more than he or she loses—the result is a *net* increase in her inclusive fitness[15] Furthermore, not every "altruistic" behavior seen in animal or human populations can be accounted for by the kin selection model, since various acts of self-sacrifice are common among genetically unrelated individuals. This model's relevance to humans has also been questioned. For example, Kohn [1990] argues that no system of human kinship relations is organized in accord with the genetic coefficients of relationship as known to sociobiologists, and asks, "What evolutionary sense can we make of the fact that a disproportionate share of acts of human violence are committed against close relatives?" Nevertheless, kin selection remains one of the most influential models among biologists, since it provides a parsimonious explanation of at least some types of self-sacrificing behavior and is at the same time consistent with the traditional view of each organism's functioning to maximize its own survival [Hoffman1981].

C. Reciprocal Altruism. Trivers [1971] has extended the theory of natural selection to another set of relationships he called "reciprocal altruism." Here an individual acts unselfishly or benevolently toward others in the expectation of being rewarded by a similar reciprocal act in the future: "you scratch my back and I'll scratch yours." Trivers uses a well-known rescue model (in which a person, A, is drowning and another genetically unrelated man, B, jumps in to save him) to show that natural selection can favor altruism, even between genetically unrelated individuals. He shows that it is in B's long-term selfish interest to help A if the probable cost to B in terms of genetic fitness for rescuing A is less than the gain to A *and* if there is a sufficiently high likelihood of a role reversal in the future.

Examples of reciprocal altruism abound. Some fish like groupers are subject to the attention of cleaner wrasses which clean up the mouth of the former; the grouper is relieved of parasites while the cleaner gets a meal. Such mutually advantageous symbioses between the fungus and alga, ant and tree species, and many insects and plants are well-known to biologists. Trivers has even contended that ape and baboon society might be built upon reciprocity in a rather general sense, because in a small group of individuals who recognize each other, cooperation is rewarded by later cooperation, and defection is punished by later defection.

According to Trivers, since human beings have the greatest capacity to recognize and remember the past behavior of other humans, as well as an unequaled ability to calculate costs and benefits, the reciprocal altruism model can explain their behavior even better. An executive of a corporation does a favor for another executive in order to get a favor in exchange. We ask ourselves how many times we would pay for a friend's drink if he were never to pay for ours. Empirical evidence for reciprocal altruism is provided by Shafir and Travesky [1992]. They found that the rate of cooperation increased significantly in a prisoner's dilemma game when subjects were told that their partner had cooperated. Note that the type of cooperation implied by the tit-for-tat strategy is also based on reciprocity in human societies. Moreover, as Axelrod [1984] shows friendship is hardly necessary for cooperation based upon reciprocity, which can develop even between antagonists. Indeed, the live-and-let-live system that emerged in the trenches during World War I is an often-cited example [Frank 1988].[16] Even many human emotions can be related to this genetic model: aggressively moral behavior keeps would-be cheaters in line; gratitude and sympathy enhance the probability of receiving an altruistic act by virtue of implying reciprocation; and guilt motivates the cheater to compensate for his misdeed [Wilson 1978; Badcock 1986].

As Kohn [1990] observed, reciprocity means, "I give you this only because I expect you will give me that (or because you already gave it to me)." But this is a far cry from true altruism: there is a huge difference between treating others as you would like them to treat you (the Golden Rule) and treating others as they have treated you (reciprocity). Others argue that in reciprocal altruism the donor's own genes are the ultimate beneficiaries of the "altruistic" act, and therefore such behavior should not be considered true altruism.[17] Thus, to the critics of the self-interest paradigm, reciprocal altruism turns out to be no more promising than kin selection. As Kohn claims, "there must be some self-maximizing advantage to rescuing or no one would do it: this is a premise, not the conclusion." Besides, there are "countless rescue attempts and displays of valor which are not the result of any expectation of reciprocal benefits" [Frank 1988].

2. Sociobiology Controversy.

If gene propagation is the prime mover in evolution, as sociobiology insists [Dawkins 1976; Cronin 1992], then all behavior must be selfish. This is because cooperation among animals does not imply any conscious intention or desire to do good on the part of the self-sacrificing individual, so that altruism in animals must be an adaptive behavior controlled by the genes to enhance genetic fitness. As biologist Richard Alexander [1987] stated, altruism is nothing but a "complex form of reproductive selfishness." Consequently, Hoffman [1981] claims that biologists have made altruism "impossible by defining [it] out of existence."

Even if the notion of inclusive fitness might account for self-sacrificing behavior in animals, can similar evolutionary concepts be employed to explain human behavior? This question was brought to the attention of a broad audience by E. O. Wilson's [1975] *Sociobiology*. Wilson's exhaustively documented classic argued that animals promote the survival of genes within individuals, and that human behavior could also be explained in a similar way. A year later Dawkins [1976] wrote, "A human society based simply on the gene's law of universal ruthless selfishness would be a very nasty society in which to live. But unfortunately, however much we may deplore something, it does not stop it being true." Alexander's [1987] approach is similar: "if people help each other, it is just to preserve their own genes."

However, this genetic approach to human behavior is not universally accepted. In perhaps the best known and certainly the most publicized response to sociobiology, the Science for the People group, which included such notables as Richard Lewontin and Stephen Jay Gould, labeled Wilson's approach socially irresponsible and racist. The scientists in the group were concerned with the implication of sociobiology that human behavior is genetically determined and biologically adaptive, and therefore cannot and should not be changed [Allen, et al. 1975]. Citing the existence of amazingly diverse human cultures and environmental factors, the prominent anthropologist Sahlins [1976] also expressed his outrage at the genetic determinism of sociobiology. Fuller [1992] asserted that evolution has given humans a genetically endowed capacity for ethical thought, but not any specific system of ethics, which evolves in the process of cultural interaction. That is, "natural selection for educability and plasticity of behavior, not for genetically determined egoism or altruism, has dominated human evolution." Kohn [1990] holds that "sociobiological accounts of genetic selfishness are of limited value in explaining human behavior," adding that, unlike animals, humans, owing to their culture and values, may make decisions which are not adaptive with respect to evolutionary considerations, e.g., fitness. Kohn notes that even the apparent success of tit-for-tat might be culturally determined. If we have been socialized to expect tat for every tit, to silently keep score in relationships, then these expectations are likely to create a reality as real as any determined by natural egoism.

The recent literature suggests that the opposition to sociobiology may have a scientific as well as a moral basis. Some biologists do not believe that species characteristics are genetically carried in the detail suggested by sociobiologists and reject theoretical arguments based on selfish competition between genes on the grounds that they ignore the importance of evolution at the level of the genome as a whole. Instead, such pluralistic opponents of sociobiology as Gould argue that selection occurs at a variety of levels. In his critique of the selfish gene hypothesis, Gould [1977] wrote that "selection simply cannot see genes and pick among them directly...Selection views bodies." His view is that since there are no particular genes for particular body parts, selection cannot even operate directly on genes through the body parts coordinated with them. That is, it is the total body that faces the ecological pressures for survival, not genes. Hull [1992] points out that replication is necessary for natural selection but not equivalent to it as the gene-based view suggests; i.e., organisms are more than just "vehicles." In fact, Masters [1978] mentions studies at the molecular level which indicate that genetic sequences can overlap, so that the concept of the gene as a totally discrete unit of natural selection may not be consistent with the physical properties of DNA strings.[18]

3. Alternative Explanations of Altruism

A. Robert Frank's Commitment Model. Not satisfied with the self-interest paradigm in evolutionary biology, some researchers have developed their own explanations of altruism. One such approach to self-sacrificing behavior in humans is Robert Frank's [1988] "commitment model," described in his book *Passions Within Reason.* Why do people leave tips in distant restaurants they will never visit again? Frank's model stresses the role of emotions in human behavior; it is feelings of guilt, anger, envy and love that predispose individuals to behave in ways contrary to narrow self-interest. According to Frank, people leave tips in distant restaurants because not only does character influence behavior, as is widely accepted, but also because behavior affects character. The self-interested opportunist wants to seem like

a good person, but at the same time to refrain from tipping in distant cities. If character traits are discernible, however, this may not be possible; "in order to appear honest, it may be helpful to be honest." So the motive for leaving a tip is not to avoid the possibility of being caught, but to maintain and strengthen the predisposition to behave honestly. A person's failure to tip will make it difficult to sustain emotions that motivate him to behave honestly on other occasions. It is this change in his emotional makeup, not his failure to tip itself, that other people may apprehend.

Frank then attempts to show that someone who always pursues narrow self-interest is doomed to fail; that passions, emotions and other "non-rational" sources of motivation often serve self-interest better in the long-run. Experiencing certain emotions enables us to make commitments that would otherwise not be credible. Consider a person who feels guilty or bad when he cheats. These feelings can cause him to behave honestly even when he knows he could get away with cheating. If others realize that he feels this way—the key is to be *known* as someone who is scrupulously honest—they will seek him as a partner in (profitable) ventures that require trust.[19] Thus under the commitment model, moral sentiments and emotions eventually lead to material advantage, but only because they are heartfelt. Frank insists that in reciprocal altruism, or tit-for-tat, the person whose cooperation is summoned only by the conditions specified by these models can hardly claim the moral high ground. The presence of emotions, however, can help account for many of the observations that pure calculations about reciprocity cannot; "the expectation of reciprocal benefits is no reason to tip in a restaurant in a distant city or dive in icy water to rescue an accident victim." But, argues Frank, generosity, love, and sympathy may provide ample motive to do so.

But in an interesting review, Kohn [1989] asserts that Frank's *Passions Within Reasons* might have been titled *Altruism Within Egoism*. For despite having shown successfully that non-self-interested behavior does exist, Frank concludes that such behavior must ultimately be motivated by self-interest. According to Kohn, the reason for Frank's popularity, and why he "has attracted back-jacket blurbs from big name economists," is that he requires mainstream economists to change only "surface elements of their belief structure" by offering, in his own words, "less a disavowal of the self-interest model than a friendly amendment to it." First consider Frank's assertion that anger, contempt, envy, guilt and greed can compete with the feelings that spring from rational calculations about payoffs. How else can we explain it when a cheated person who feels angry and spends hundreds of dollars to get a refund of a few dollars? Someone who becomes very angry when dealt with unjustly does not need a formal contract to commit him to seek revenge. He will do so even if in purely material terms it does not pay. "The satisfying feeling someone gets from having done the right thing is its own reward," concludes Frank. Yet he adds, "but we can't eat moral sentiments, they must have a material payoff" in order to have evolved. Similarly, consider his favorite example, tipping a waiter we do not expect to see again. Neoclassical theory suggests we will stiff him since there is nothing to be lost by doing so. Frank says we tip, with the motivation to "strengthen the predisposition to behave honestly," *which eventually will work to our advantage*. Again, behind evidence of admirable actions lies long-range selfish gain.

B. Herbert Simon's Docility Model. In a well-known paper published in *Science*, Herbert Simon [1990] proposes a "simple and a robust mechanism, based on human docility and bounded rationality," which could explain how altruism could have survived in humans. By docility, Simon means "receptivity to social influence" and "the tendency to depend on suggestions, recommendations, persuasion, and information obtained through social channels as a major basis for choice." In particular, docile persons will tend to learn what they perceive others in the society would like them to learn. We learned most of our skills and knowledge from others or books; we did not invent them. Reliable authorities tell us to eat less fat and exercise, which we do without first reviewing the evidence or conducting our own research. We believe that the information on which this advice is based is better than the information we could gather on our own [Simon 1993]. Also, we feel that following this advice is for our own good. Obviously, the contribution of docility to fitness may be enormous, which is why it will be positively selected.

Simon asserts that society can impose a "tax" on the benefits gained by individuals from docility by inducing them to engage in altruistic behaviors. Bounded rationality (the fact that we have "only incomplete and uncertain knowledge about the environment") will prevent the docile individual from avoiding this tax. That is, a docile person, enjoying the advantage of that docility by having more offspring, will also accept the society's instructions to be altruistic as part of expected behavior. This is because he or she will be unable to distinguish socially prescribed behavior that contributes to fitness from altruistic behavior; in other words, under bounded rationality, individuals cannot be expected to screen what they learn for its contribution to fitness.[20] Now, since there must be a net fitness advantage for docility to survive, an upper limit exists on altruism, i.e., the gross benefits from docility must exceed the cost to the individual of the altruistic behavior. Accordingly, Simon shows that greater fitness will help docile people increase in relative number in the population. Thus, he concludes that even if genes are the controlling sites for natural selection (the assumption most antagonistic to true altruism), his model allows for docility, and hence altruism, to survive.

C. Altruism in Disasters. The main body of research on altruistic behavior during disasters can be divided into two groups: explanations based on a taste for altruism [Kuntreuther and Dacy 1969; De Alessi 1968], and those based on the notion that disasters do not change people's tastes but rather their opportunities [Hirshleifer 1987]. Kunreuther and Dacy, after reviewing the ample evidence of helping behavior in natural catastrophes, theorize that disaster induces a flourishing of "community feeling" that is omitted from conventional economics. They claim that following a shift in the supply curve of some necessities to the left in a disaster, the demand for these goods also declines because of self-rationing. It is this community feeling which explains why the prices of necessities may remain unchanged or even fall after a disaster, which brings about a change in tastes and therefore leads to a shift in the utility function. Alternatively, De Alessi [1968] argues that a disaster leads to a movement along a given utility map, rather than a shift of the utility function. Assume that a typical individual has a positive taste for charity. If his utility is a function of "his real income" and "his neighbor's real income," and the indifference curves have the standard properties of negative slope, convexity, and normality of both goods, a relative decline in his neighbor's real income will raise the relative marginal utility to him of his neighbor's consumption. The individual will then be inclined to transfer at par a dollar's worth of his consumption for a dollar's worth of his neighbor's.

Hirshleifer's [1987; 1978 and 1995] studies of economic behavior during natural catastrophes and war are well-known. His analysis of altruism in disasters begins with the observation that the weakening of the normal social control mechanisms might be expected to cause anti-social elements to violate laws and customs and all people to attach much higher priority to the selfish necessity of personal survival rather than community needs or interests. But the evidence has shown that the opposite tends to occur.[21] As "impressive" examples of good behavior, Hirshleifer [1987] points out the way in which the populations of England, Japan and Germany stood up to bombing attacks during the World War II. Why do people behave cooperatively? His explanation assumes away the taste for altruism. For although some people have a positive taste for altruism, an individual's utility map will have a negative partial derivative with respect to the other fellow's income, at least on the margin.[22]

Hirshleifer instead explains altruism as the result of "rational selfish calculation of the advantage of maintaining the *alliance* we call society." His approach treats good behavior or the "alliance-supporting activities" as a public good, since their benefits are not realized as private gains but are diffused throughout the society. Despite the enormous value to the average person of maintaining an organized, orderly and prosperous society—even to a rational criminal the preservation of the social alliance is of critical importance—the perceived marginal effects of his own alliance-preserving actions will be very small. Therefore, like every other collective good, alliance-supporting activities will be undersupplied, and the criminal will engage in disruptive activities as long as he feels the community will survive anyway, so that he can spend his ill-gotten gains in a pleasant environment. But disaster changes this, since suddenly the state of the society's health, in some cases even its continued existence, may be in doubt.

Then the marginal effectiveness of an individual's actions is multiplied by a large factor. Each individual reasons that even a single person's selfish behavior could trigger an explosion of hardship from which all would lose. In such a situation, a high-level of alliance-supporting activities may be expected, regardless of whether people have a positive or negative taste for altruism.

One could argue, of course, that cooperative behavior generated by a desire to "preserve order" is hardly well-described by the term altruism. Suppose a person is less likely to loot a store (an activity which promotes disorder) when there is a danger of *general* disorder, since he is concerned about the costs of such behavior. Given the fact that this person does not care about the well-being of the potential victim of his crime, it is difficult to call his restraint altruism.

D. The Utility Theory and Altruism. It should be clear by now that sociobiologists' explanations of altruism, and the reactions they elicited have ultimately led to the recognition that there is room in the utility function for motives other than narrow self-interest.[23] The models by Frank, Simon, Hirshleifer and others reviewed above constitute examples of how sociobiology has helped amend the conventional self-interest model and the utility function. Frank [1987] has long insisted that the basic problem with the standard choice model was its complete disregard for emotions, and has suggested that minor alterations in the utility function, such as taking into account concern for others and the role conscience and moral sentiments play in decision-making, can produce significant changes in the conclusions that emerge from economic models. Nowadays, the standard model of choice is still defended, but preferences are no longer necessarily narrowly self-interested.

Many writers have questioned the commitment of neoclassical economists to explain all behavior in terms of self-interest, and to treat altruism, much like sociobiologists, as a subset of egoism. They argue that extending the utility function to include welfare of others affords obvious flexibility, but at a cost. The self-interest paradigm remains in place, because economic agents now can account for altruistic motives as well. But the cost is that it becomes impossible to distinguish between altruism and selfishness. After all, with the appropriate utility function, a person could selfishly give away millions of dollars. In fact, any behavior could be "explained" after the fact simply by assuming a taste for it. So Collard [1978] notes how the assumption of self-interest is sometimes tautological; the man who drowns in rescuing a child is said to be serving his own interest "just as a man seeking promotion serves his." Kohn [1990] indeed cites a mainstream economist who wrote that those who risk their lives to save a child "get their names in the newspapers and this may be the 'real' reason why they rescue complete strangers." Kohn objects that if all actions are selfish, then the term has no meaning and the neoclassical argument becomes unfalsifiable. According to him, the acknowledgment in the utility function that an individual can derive satisfaction from the act of giving is still unreliably egoistic; the source of the benefit to the donor merely shifts from product to process.

V. CONCLUDING REMARKS

In recent decades, complementary developments in behavioral sciences and sociobiology have been valuable in exploring the principles of human behavior from a multidisciplinary perspective. In particular, both the theoretical work and field experiments in sociobiology have been important in renewing an interest in human nature and in the question of whether biological or environmental factors can better explain human behavior. Most researchers now agree that both genetic factors and the environment (e.g., education, culture, social conditioning) matter, though the debate on the relative importance of each continues.[24] Even if sociobiological models like kin selection and reciprocal altruism have failed to resolve one of the most contentious debates of the twentieth century over "nature vs. nurture," they have helped broaden the scope of mainstream economics into areas like family, charity and giving, and intergenerational considerations. They also were instrumental in the amendment of the narrow rational self-interest model to include moral concerns. This is accomplished either by putting moral concerns into the preference function (for example, Frank [1987]), or by putting these concerns into the individual's

constraints as some sociologists do (see, Goldfarb and Griffith [1991] for details), or by putting them into the way individuals strategically interact (as in Axelrod's [1984] tit for tat rules). Some consider these developments a significant theoretical advance. To them, there is no need to step outside the neoclassical paradigm to accommodate altruism, since self-interest can be conceived broadly. But to others, a defense of altruism in terms of self-interest is not capable of capturing its true nature, even if, as Walsh [1994] put it, "enlightened self-interest might have some elements of humanity about it that narrow self-interest may not."

ENDNOTES

1. A particularly confusing feature of the literature must be made clear at the outset: many authors shift the meaning of "selfishness" between narrow and broad definitions, often without making clear which one is being used. Also the term "altruism" has various meanings, for example that "your" welfare is an argument in "my" utility function, or that human choice is influenced by expectations of pleasure and pain of others, or that one's act involves a sacrifice.

   The reader should also note that recent debate over altruism has affected various areas in economic theory, some of which will not be dealt with in this paper, given limited space. Those interested in neoclassical approach to altruism and economics of family should see Becker [1976; 1981; 1991], and Bergmann [1996] for an articulation of its feminist criticism. For a discussion of the Ricardian equivalence and altruism in infinite-horizon models, see, among others, Altig and Davis [1992], Altonji et al [1992], Kuehlwein [1993], and especially, Wilhelm [1996].

2. For decades, the utility theory, which analyzes the effect of human preferences on economic behavior, told us little about how these preferences are determined in the first place. But any meaningful study in the utility theory must be developed with a comprehensive view of human nature, which was taken as given. Many evolutionists, including Hirshleifer [1977] and Rogers [1994] maintained that such a view is found in sociobiology, where human preferences are thought to have evolved by natural selection. So, for example, if economists assumed people love their children, sociobiologists could explain it. Alan Rogers suggested that if selection acts on "biological" characteristics such as size and shape, as is generally accepted, then it could also act on preferences. Consider sexual preferences. Most people prefer to mate with opposite-sexed individuals of their own species. Why? According to Rogers, presumably because those who preferred otherwise left fewer offspring (if any!) and thus were selected against. If natural selection affects sexual preference, why not, say, time preference? Rogers identifies three factors that lead humans to prefer current consumption to future consumption: (a) an expectation of rising consumption in the future, a fact well-known by economists, (b) declining reproductive value, both because of a steady decline in the expectation of future life and because of a decline in fertility (the effects of which are normally ignored by economists), and (c) the probability that delayed benefits may accrue to children or other descendants rather than to the investor, i.e., the strength of the bequest motive (which is incorporated into most recent intergenerational economic models).

3. As we shall see below, the gene-based selection theory described here that dominates modern biology is by no means universally accepted; alternative views of natural selection, such as Stephen Jay Gould's notion of contingent evolution, do exist.

4. The recent debate on selfishness and altruism sparked a renewed interest in Adam Smith's writings and a number of researchers have argued that the traditional conception of Smith severely misrepresents his actual views on human nature. Sen [1987] insists that Smith did not hold a rigid model of humans as self-maximizers, as contrasted with those who invoke his name. He writes, "there is little evidence that A. Smith believed people *actually* behave in an exclusively self-interested way," declaring that Smith's championing of sympathy and prudence in *The Theory of Moral Sentiments* has tended to be lost in the writings of many economists regarded as describing the so-called Smithian position on the achievements of self-interest. Frank [1988] also confirms that in much of his writings, particularly in *The Theory of Moral Sentiments*, Smith actually wrote "movingly of man's compassion for his fellows." His appeal to self-interest is carefully confined within limits consistent with an explicit moral philosophy, of which it is an integral part, adds Walsh [1994]. Hahn [1991] highlights the following passage from *The Theory of Moral Sentiments*, "How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure of seeing it." Rothschild [1994] argues that the invisible

hand is in conflict with other parts of Smith's work, and that Smith thought of it as an ironic but useful joke.

5. Biologists were introduced to the game theory in the early 1970s by their colleague John Maynard Smith [1972].
6. It has been commented that "the universal fascination with this game is due to its representing, in very stark and transparent form, the bitter fact that when individuals act for their own benefit, the result may be disaster for all" (Robert J. Aumann cited in Walsh [1994]).
7. The reasoning is that any reward from cooperation must arise from the favorable response of the other player in later rounds. Therefore, there is no reason for departing from defection on the last round, since there are no later rounds. It follows that there is no incentive to cooperate in the last-but-one round either, since none of the players will cooperate in the last round anyway. Inducing backwards, it can be shown that the game will unravel all the way back to mutual defection on the first move.
8. For example, in one study, cited by Kohn [1990], a six- to ten-year old child stood on a busy street and said to passerby, "I'm lost. Can you call my house?" On average, about three-fourths of the adults in twelve small towns did so, compared with less than half in big cities.
9. In Isaac, McCue and Plott's experiment positive levels of the public good were produced in initial periods, but with repetition those levels eventually declined to almost zero. Thus they wrote, "Our results unambiguously demonstrate the existence of the underprovision of public goods and related 'free riding' phenomenon and thereby discredit the claims of those who assert as a general proposition that the phenomenon does not or cannot exist." See, Roth [1995] for further details.
10. The reader can see easily that the highest possible score in a prisoner's dilemma game can be obtained by defecting at each move against a program which always cooperates (sucker)—the worst possible strategy. But obviously, defecting at each move against itself would not win the highest score possible since the payoff for mutual defection is less than that for mutual cooperation or successful defection. If each of two players plays tit-for-tat, the result would be mutual cooperation in every play of the game, and these players would receive the largest possible aggregate payoff. For more examples, see Badcock [1986] as well as Axelrod [1984].
11. For example, one might work as advertising writer for cigarettes, while another might write advertising copy for the Nature Conservancy; or consider being an accountant for a large petrochemical company versus for a large art museum, or a lawyer for the NRA versus a lawyer for the Sierra Club.
12. Frank [1996] also finds that women are more likely to choose jobs which afford higher measures of moral satisfaction, and that, since men who choose such jobs pay the same wage penalty that women do, measures of moral satisfaction also explain some of the wage differential between sexes.
13. Of course, as Smith [1972] notes, even more interesting question is why the results of conflicts between males of many other species (many birds, for example) are decided without *any* physical contact, e.g., by display.
14. Hamilton [1964] has shown how altruism among relatives is related to the degree of relatedness or kinship of the actors: the greater the percentage of genes shared by common descent, the more helpful the altruistic act and the greater readiness to sacrifice one's own fitness. A precise relationship between the degree of altruism and the degree of kinship was shown by Eberhard [1975], who showed how inclusive fitness incorporates altruism toward quite distant relatives.
15. Nevertheless, much behavior toward close relatives might still reveal courageous self-sacrifice and perhaps should not be equated to narrow self-interest. As Frank [1988] reminds, "just consider political prisoners who submit to torture in order to shield their kin." Moreover, as Hoffman [1981]

discusses, if a self-sacrificing individual is viewed as more than just a carrier of genes and as a total organism, then the physical or psychological cost of an act could make it truly altruistic.

16. The trench fighting during the World War I certainly has the elements of a "game" that would be required for the emergence of reciprocal altruism: the identities of soldiers (players) were rather stable; interactions between them were repeated for extended periods; each side could easily detect defection of the other, and so on. Historians' description of the mutual restraint of both German and Allied fighting units leaves no doubt that reciprocal altruism did emerge as the preferred strategy.

17. Collard [1978] would prefer to use the term "coupled egoism" in place of "reciprocal altruism." According to Frank [1988], the difficulty with tit-for-tat and reciprocal altruism in general is that they are examples of "prudent" behavior: "enlightened prudence, to be sure, but self-interested behavior all the same."

18. Interestingly, an article by Blakeslee [1997] in the *New York Times* describes how recent studies of whole organisms have seriously challenged the reign of genes. The article discusses the theoretical work of biologists like Goodwin and Gilbert, who show that an individual gene is in fact less important than the network in which it operates.

19. To see why the key problem in Frank's model is to communicate honesty, consider a prisoner's dilemma game. When altruists and egoists are indistinguishable, the former are destined for extinction. But if they are perfectly distinguishable, they can—and will-choose to interact selectively with each other; no altruist need ever to interact with an egoist. Clearly, the payoff to two egoists (defectors) will be lower than the payoff to two altruists. The latter will be selected for by evolution since they will be fitter—they can raise larger families with larger payoffs. Eventually defectors will face extinction. See Frank [1988] for details.

20. Simon [1990] writes that "belief in large numbers of facts and propositions that we have not had the opportunity or ability to evaluate independently is the basic human condition—a single corollary of the bounded rationality."

21. Of course, there are examples of "bad behavior" as well—such as the incidents of looting during the Chicago blizzard of February 1967—but many writers agree that "good behavior" dominates (see Hirshleifer [1987] for further examples).

22. Hirshleifer assumes that for most people the marginal utility of other people's income remains positive only up to some level "safely below their own income."

23. Of course, complementary developments in other fields, such as sociology, psychology and anthropology, were also important in the amendment of the neoclassical economics. For example, see Rabin [1998] for how psychology might help economists to understand preferences, and in particular, how people depart from narrow self-interest to pursue "other-regarding" goals such as fairness and reciprocal altruism.

24. It must be noted though that sociobiology and new research tend to favor the hereditary view that genes influence human abilities, personality, aggression and sexuality. Nevertheless, many thinkers [see Kohn 1990], claim that while biology does matter, upbringing, schooling, even nutrition can also shape behavior, that human intellect is capable of learning how to modify behavior to suit our social surroundings. For example, that exposure to the self-interest model, as commonly used in neoclassical economics, might itself encourage self-interested behavior has been suggested by a number of studies, which generally indicate that economists are more likely to defect in social dilemmas than other [see, Frank et. al. 1993, Marwell and Ames [1981], Carter and Irons [1991], Seguino [1995] and Frank et. al. 1996].

REFERENCES

Alexander, R. *The Biology of Moral Systems.* Hawthorne, N.Y.: Aldine de Gruyter, 1987.

Allen, E. et al. "Against 'Sociobiology,'" letter to the November 13 issue, *New York Review of Books,* 1975.

Altig, D. Davis, S. The Timing of Intergenerational Transfers, Tax Policy, and Aggregate Savings," *American Economic Review,* 1992, 1199-1220.

Altonji, J., Hayashi, F. and Kotlikoff, L. "Is the Extended Family Altruistically Linked? Direct Tests Using Micro Data," *American Economic Review,* 1992, 1177-98.

Axelrod, R. *The Evolution of Cooperation.* New York: Basic Books, 1984.

Badcock, C. *The Problem of Altruism.* Oxford: Basil Blackwell Ltd, 1986.

Barro, R. "Are Government Bonds Net Wealth?" *Journal of Political Economy,* 1974, 1095-117.

Becker, G. "A Theory of Social Interaction," *Journal of Political Economy,* 1974, 1068-93.

_____. "Altruism, Egoism, and Genetic Fitness: Economics and Sociobiology," *Journal of Economic Literature,* 1976, 817-26.

_____. "Altruism in the Family and Selfishness in the Market Place," *Economica,* 1981, 1-15.

_____. *A Treatise on the Family.* Cambridge: Harvard University Press, 1991.

Bergmann, B. "Becker's Theory of Family: Preposterous Conclusions," *Feminist Economics,* 1996, 141-50.

Bergstorm, T. and Stark O. "How Altruism Can Prevail in an Evolutionary Environment," *American Economic Review,* 1993, 149-55.

Blakeslee, S. "Some Biologists Ask 'Are Genes Everything?" *The New York Times,* September 2, 1997, C1.

Bohm, P. "Estimating Demand for Public Goods: An Experiment," *European Economic Review,* 1972, 111-130.

Carter, J. and Irons, M. "Are Economists Different, and If So, Why?" *Journal of Economic Perspectives,* 1991, 171-77.

Collard, D. *The New Right: A Critique.* Fabian Society, 1968.

_____. *Altruism and Economy: A Study in Non-selfish Economics.* New York: Oxford University Press, 1978.

Cronin, H. *The Ant and the Peacock: Altruism and Sexual Selection from Darwin to Today.* Cambridge: Cambridge University Press, 1992.

Davidson, G. and Davidson, P. *Economics for a Civilized Society.* New York: Norton, 1988.

Dawkins, R. *The Selfish Gene.* New York: Oxford University Press, 1976.

De Alessi, L. "The Utility of Disaster," *Kyklos,* 1968.

_____. "Toward an Analysis of Postdisaster Cooperation," *American Economic Review,* 1975, 127-38.

Eberhard, M. "The Evolution of Social Behavior by Kin Selection," *The Quarterly Review of Biology,* 1975, 1-33.

Elster, J. "Emotions and Economic Theory," *Journal of Economic Theory,* 1998, 47-74.

Etzioni, A. *The Moral Dimension: Toward a New Economics.* New York: Free Press, 1988.

Frank, R. "If Homoeconomicus Could Choose His Own Utility Function, Would He Want One with a Conscience?" *American Economic Review,* 1987, 593-604.

_____. *Passions Within Reason.* New York: W.W.Norton & Company, 1988.

_____. "What Price the Moral High Ground?" *Southern Economic Journal*, 1996, 1-17.

Frank, R., Gilovich, T and Regan, D. "Does Studying Economics Inhibit Cooperation?" *Journal of Economic Perspectives*, 1993, 159-71.

_____. "Do Economists Make Bad Citizens?" *Journal of Economic Perspectives*, 1996, 187-89.

Fuller, R. *Ecology of Care.* Louisville: Westminster/John Knox Press, 1992.

Ghiselin, M. "The Economy of the Body," *American Economic Review*, 1978, 233-37.

Goldfarb, R. and Griffith, W. "Amending the Economist's 'Rational Egoist Model to Include Moral Values and Norms, Part 2: Alternative Solutions," in Koford, R. and Miller, J. eds., *Social Norms and Economic Institutions*, Ann Arbor: University of Michigan Press, 1991, 59-84.

Gould, S. "Caring Groups and Selfish Genes," *Natural History*, December 1977, 20-24.

Hahn, F. "Benevolence," in Gay Meeks, ed., *Thoughtful Economic Man*, Cambridge: Cambridge University Press, 1991.

Hamilton, W. "The Genetical Evolution of Social Behavior," *Journal of Theoretical Biology*, 1964, 1-52.

Hardin, G. "The Tradegy of the Commons," *Science*, 1968, 1243-48.

Hirshleifer, J. "Economics from a Biological View," *Journal of Law and Economics*, 1977, 1-52.

_____. "Natural Economy vs. Political Economy," *Journal of Social and Biological Structures*, 1978, 319-337.

_____. *Economic Behavior in Adversity.* Chicago: University of Chicago Press, 1987.

_____. "The Dark Side of the Force," *Economic Inquiry*, 1994, 1-10.

_____. Anarchy and its Breakdow," *Journal of Political Economy*, 1995, 26-52.

Hoffman, M. "Is Altruism Part of Human Nature?" *Journal of Personality and Social Psychology*," 1981, 121-137.

Hull, D. "Sex and Sensibility," *Nature*, 1992, 623-24.

Kohn, A. "Altruism within Egoism," *The Nation*, 29 May 1989, 742-44.

_____. *The Brighter Side of Human Nature.* New York: Basic Book, Inc., 1990.

Kuehlwein, M. "Life-Cycle and Altruistic Theories of Saving with Lifetime Uncertainty," *Review of Economics and Statistics*, 1993, 38-47.

Kunreuther, H. and Dacy, D. "The Peculiar Economics of Disaster," in D. Dacy and H. Kunreuther, eds., *The Economics of Natural Disasters: Implications for Federal Policy*, New York, 1969.

Ledyard, J. "Public Goods: A Survey of Experimental Research," in Kagel, J. and Roth, A., eds., *Handbook of Experimental Economics*, Princeton: Princeton University Press, 1995.

Marwell, G. and Ames, R. "Economists Free Ride, Does Anyone Else?" *Journal of Public Economics*, 1981, 295-310.

Masters, R. "Of Marmots and Men: Animal Behavior and Human Altruism," in Wispe, L., ed., *Altruism, Sympathy, and Helping*, New York: Academic Press, 1978.

Olson, M. *Logic of Collective Action.* Cambridge: Harvard University Press, 1965.

Piore, M. *Beyond Individualism.* Cambridge: Harvard University Press, 1995.

Quarantelli, E and Dynes, R. "Community Conflict: Its Absence and Its Presence in Natural Disasters," *Mass Emergencies*, 1976, 139-52.

Rabin, M. "Psychology and Economics," *Journal of Economic Literature*, 1998, 11-46.

Rogers, A. "Evolution of Time Preference by Natural Selection," *American Economic Review*, 1994, 460-81.

Rose-Ackerman, S. "Altruism, Nonprofits, and Economic Theory," *Journal of Economic Literature*, 1996, 701-28.

Roth, A. "Introduction to Experimental Economics," in Kagel, J. and Roth, A. eds., *The Handbook of Experimental Economics*, Princeton: Princeton University Press, 1995.

Rothschild, E. "Adam Smith and the Invisible Hand," *American Economic Review*, 1994, 319-26.

Sahlins, M. *The Use and Abuse of Biology*. Ann Arbor: University of Michigan Press, 1976.

Samuelson, P. "Altruism as a Problem Involving Group vs. Individual Selection in Economics and Biology," *American Economic Review*, 1993, 143-48.

Seguino, S., Stevens, T., and Lutz, M. "Gender and Cooperative Behavior: Economic Man Rides Alone," *Feminist Economics*, 1996, 1-21.

Sen, A. "Rational Fools: A Critique of the Behavioral Foundations of Economic Theory," in Harris, H., ed., *Scientific Models and Man*, Oxford: Clarendon Press, 1979.

Sen, A. *On Ethics and Economics*, Oxford: Basic Blackwell, 1987.

Shafir, E. and Tversky, A. " Thinking through Uncertainty: Nonconsequential Reasoning and Choice," *Cognitive Psychology*, 1992, 449-74.

Simon, H. "A Mechanism for Social Selection and Successful Altruism," *Science*, 1990, 1665-68.

_____. "Altruism and Economics," *American Economic Review*, 1993,156-61.

Smith, J. *On Evolution*, Edinburgh: Edinburgh University Press, 1972.

Titmuss, R. *The Gift Relationship: From Human Blood to Social Policy*, New York: Random House, 1971.

Trivers, R . "The Evolution of Reciprocal Altruism," *Quarterly Review of Biology*, 1971, 35-57.

Tullock, G. "Economics and Sociobiology: A Comment," *Journal of Economic Literature*, 1977, 502-05.

Walsh, V. "Rationality as Self-Interest versus Rationality as Present Aims," *American Economic Review*, 1994, 401-05.

Wilhelm, M. "Bequest Behavior and the Effect of Heirs' Earnings: Testing the Altrusitic Model of Bequests," *American Economic Review*, 1996, 874-92.

Williams, G. *Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought*. Princeton: Princeton University Press, 1966.

Wilson, E. *Sociobiology: The New Synthesis*, Cambridge, Mass.: Belknap Press of Harvard University Press, 1975.

_____. "The Genetic Evolution of Altruism," in Lauren Wispe, ed., *Altruism, Sympathy, and Helping*, New York: Academic Press, 1978.

A FINANCIAL PROFILE OF COMPANIES THAT EXPERIENCE HIGH GROWTH RATES IN PERIODS OF ECONOMIC DOWNTURN

by

Bruce C. Payne* and Robert D. Cruz**

In the United States, only nine recessions have occurred since the end of World War II, using two consecutive quarters of negative growth in real Gross Domestic Product (GDP) as the definition of recession.[1] Economic downturns, on the other hand, are defined as a reduction in the rate of economic growth, at a time when economic indicators give mixed signals, and the economy is vulnerable to recession (Norton, 1995). They are a part of any business cycle, but unpredictable. Some companies have developed a pattern of preparing for economic downturns during periods of record profits. For example, Richman (1995) reports that Dupont had a record profit of $2.7 billion in 1994. In that same year, the firm eliminated 7000 jobs, either shutdown or divested 18 businesses, and cut research and development spending to 60 percent of the 1990 level. Dupont made these aggressive, preemptive moves to reduce the impact of any future recession. More interestingly, some companies that have not used such preemptive tactics have had record growth rates during economic downturns (e.g., Coca-Cola, Hewlett Packard and Circuit City Stores). It is these companies with which this study is concerned. A fair question is: in what way, if any, are they different?

The phenomenon of growth whether measured in sales, size or the present value of invested dollars has received much attention in the financial and economic literature over the past three decades (Basu,1977; Goodman and Peavy, 1986; Shuman and Seeger, 1986; Melicher and Miedich, 1985, 1987). Most previous studies have concentrated on the factors that explain and influence growth within companies. Other studies have sought to determine whether an optimum growth rate exists. For example, Nerlove (1968) and Stano (1976) found a significant positive relationship between the rate of sales growth and the return to shareholders. Melicher and Meidich (1985) extended the Nerlove and Stano study and examined the relationship between sales growth rates and stockholder returns to determine whether optimal sales growth rates are identifiable. By examining a 450-firm sample covering the 1964-1978 period, they found a consistently positive relationship between sales growth rates and stockholder returns even at very low and very high growth rates. They also examined whether the growth-return relationship holds in a risk-return market framework and concluded that the relationship does hold when the experimenter controls for systematic risk.

Payne (1993) was interested in the characteristics of growth companies and made the distinction between growth companies and growth stocks. Solomon (1963) defined a growth company as "one that is based on opportunities to use capital internally at yields that are above the normal rate of return." Those

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opportunities may exist because of the company's special and nonreproducible position in technology, manpower, or markets. Microsoft may be a good example. *Value Line* defines growth stocks in terms of the percentage change in share price. Obviously, growth stocks may be characteristic of growth companies, but opportunities to use capital internally are difficult to measure and may not be quantifiable. Thus, the *Value Line* definition as the percentage changes in share prices is used in this study. It is a measure of changes in the market value of the firm, and good data are available. It would be expected that company growth rates are highly correlated with macroeconomic growth and prosperity. As stated earlier, however, there are companies that experience abnormally high rates of growth during economic downturns.

The purpose of this study is to identify the financial characteristics of companies that have high growth rates during economic downturns. More specifically, the study is concerned with those variables that are indicators of the firm's risk-return tradeoff and measure how that risk-return tradeoff is perceived by professional analysts and investors at the margin. The buying and selling behavior of this latter group determines the value of the firm. If the set of financial variables that describes growth firms is found to be unique, the set possibly could be used to identify those firms that may become, or continue to be, growth firms during economic downturns. This information would have implications for investors, investment counselors, and managers. Thus, the study also contains a test of the predictive power of the set of financial variables we identified below.

METHODOLOGY

The issues to be resolved are first classification or prediction, and then evaluation of the accuracy of that classification. More specifically, can firms be assigned, on the basis of selected variables, to one of two groups: (1) firms known to have experienced high growth rates during periods of economic downturn, or (2) firms selected at random? Multiple discriminant analysis (MDA) provides a procedure for assigning firms to predetermined groupings based on variables or attributes whose values may depend on the group to which the firm actually belongs.

If the purpose of the study were simply to establish a financial profile of growth firms, simple ratios would be adequate. Part of the purpose, however, involves prediction. In a seminal paper on the use of MDA in finance, Altman (1968) showed that sets of ratios used in multivariate analysis were better descriptors of the companies and had more predictive power than individual ratios used in univariate tests.

The use of MDA in the social sciences for the purpose of prediction is well known. MDA is appropriate when the dependent variable is nominally or ordinally measured and the predictive variables are intervally measured. In addition to its use in the Altman study to predict corporate bankruptcy, MDA has been used to predict the credit worthiness of used car loan applicants (Durand, 1941), common stock quality ratings (White, 1975), financially distressed property-liability insurance firms (Trieschmann and Pinches, 1973), and the failure of small businesses (Edmister, 1982). These studies had one thing in common; the groups in which the firms were classified were nominally measured: good-bad, failing-nonfailing, likely to bankrupt-not likely to bankrupt, or in the case of stock quality ordinal ratings. This study also employs nominally measured dependent variables and intervally measured predictive variables. The nominally measured dependent variables are: high growth firms (HGF), and randomly selected firms (RSF). The computer program used to perform the analysis is BMDP-07.M Discriminant Analysis (Dixon, 1992). Since the objective of the analysis was to determine the discriminating capabilities of the entire set of variables without regard to the impact of individual variables, all variables were entered into the model simultaneously. This method is appropriate since we are not interested in the predictive power of any one variable, but instead the predictive power of the entire set of discrimants (Hair et al, 1992, 99).

SELECTION OF SAMPLE AND INDEPENDENT VARIABLES

All data used in the analysis were gathered from *Value Line Ratings and Reports*. The sample consists of two groups of fifty firms. The first group was drawn from *Value Line's* screen of firms with high growth rates during the economic downturn from the first quarter 1994 to the third quarter of 1996. During this period real economic growth in the United States slowed from 4.1 percent to 2.1 percent annually.

Value Line lists one hundred of these high growth firms (HGFs, see list in Appendix I) alphabetically. We selected the first fifty, and reserved the remaining 50 to replicate the test in the event the validation process was unclear. This exhausted the database. The second group is a group of fifty firms randomly selected from *Value Line* (Randomly Selected Firms, RSF, in Appendix II). Companies are organized by industry in *Value Line.* After a HGF was selected, a company from the same industry section was chosen randomly. Thus, the RSF were chosen randomly, but with a matching concept so that the industry profile of this group matched that of the HGF group. That is, for each company in group one, there is a company in group two that matches the financial and business characteristics of the company in group one. For example, Home Depot is in group one and Lowe's is in group two. Computer Science is in group one, and Compaq Computer is in group two. Altogether there are 25 different industries in the sample and each group has the same number of companies from each industry (Appendix III). *Value Line's* industry grouping renders this a relatively easy process.

Previous studies on this subject have chosen explanatory variables by various methods and logical arguments. In this paper the group of explanatory variables contains a measure of return on investment, a measure of systematic risk, a measure of unsystematic risk, a measure of what investors at the margin think of the company's earnings, and a measure of the size of the firm. An evaluation of these measures is needed to accomplish the purpose of this study.

The measure of return is return to total capital. Return to total capital includes a return to creditors as well as owners and recognizes that value is affected by the cost of debt. A measure of return to equity could be used, but it would ignore the cost of debt and the fact that assets are financed by debt as well as equity. A basic tenet of this study is that investors at the margin evaluate the degree of risk in an investment and compare it to the investment's potential rate of return. In finance literature this is referred to as the "risk-return tradeoff." Investors at the margin "trade off" proxies for risk and return in buying and selling securities to establish demand and, thus, price or market value.

Sharpe's beta is used to measure systematic risk. Investors cannot be expected to be compensated for assuming unsystematic risk, but the purpose here is to find the characteristics of growth companies during economic downturns. Thus, it is necessary to identify the degree of unsystematic risk. The residual variance in the calculation of the above-mentioned betas is used as a measure of unsystematic risk.

The price earnings ratio is included in the analysis to provide a rough idea of what investors at the margin think of the company. Researchers are understandably reluctant to use the price earnings ratio in academic research since accounting methods can greatly influence the value of this variable. The ratio can be used for comparative purposes only when the earnings are computed in exactly the same manner for all firms in the sample. *Value Line* and other reputable data sources take great care to compute all data using the same methods. Thus, *Value Line's* price earnings ratios may be used for comparative purposes among their firms. It would not be appropriate to compare a *Value Line* p/e ratio with the same variable from another reporting source such as *Moody's* or *Standard and Poors.* In addition, a size variable is included because previous studies do not clearly show whether value is in any way associated with size. The logarithm of sales is used as a measure of size.

In summary, there are five explanatory variables in the multiple discriminant model. They are listed as follows:

X_1 – Sharpe's Beta;

X_2 – Logarithm of sales.

X_3 – Return to total capital.

X_4 – Price earnings multiple.

X_5 – Unsystematic risk.

The explanatory variable profile contains basic measures of common financial variables. They were chosen, as in any experimental design, because of their consistency with theory, adequacy in measurement, the extent to which they have been used in previous studies (Altman 1968, Edmister 1982, Trieschmann and Pinches 1973) and their availability from a reputable source.

TEST AND RESULTS

The discriminant function used has the form:

(1) $$Z_j = V_1X_{1j} + V_2X_{2j} + ... + V_nX_{nj}$$

where:

X_{ij} is the company's value for the ith independent variable.

V_i is the discriminant coefficient for the ith variable.

Z_j is the jth company's discriminant score.

The function derived from the data in this study in equation 1 is:

(2) $$Z_j = 4.82513 - 0.68492X_1 - 0.09421X_2 - 0.48015X_3 - 0.13820X_4 + 0.25807X_5$$

Classification of firms is relatively simple. The values of the five variables for each firm are substituted into equation (2). Thus, each firm in both groups receives a Z score. If a firm's Z score is greater than a critical value, the firm is classified in group two (RSF). Since the two groups are heterogeneous, the expectation is that randomly selected firms will fall into one group and growth firms will fall into the other. The variances of the two groups are statistically equal. Therefore, the midpoint value between the two group means can be defined as the critical value. This is the value that minimizes overlap and the probability of misclassification. Zero is the expected critical value when the two groups are of equal size and the variances of each group are equal. In this analysis the mean Z value for the RSF is 0.81252; the mean Z value for the HGF is -0.81252. Thus zero is the mean value and the matrices are equal.

Interpretation of the results of discriminant analysis is usually accomplished by addressing four basic questions (Frank, Massey and Morrison,1965).

(1) Is there a significant difference in the mean vectors of variables for the two groups of firms?

(2) How well did the discriminant function perform?

(3) How well did the independent variables perform?

(4) Will this function discriminate as well on any random sample of firms as it did on the original sample?

To answer the first question the familiar F-test is used. The calculated value of F is 12.67 which exceeds the critical value of F at the five percent level of significance (with 6 and 94 degrees of freedom, $F_{.05} = 2.33$). Thus, the null hypothesis that there is no significant difference between the financial profiles of the growth firms and the randomly selected firms is rejected. The first conclusion of the study, therefore, is that the two groups of firms have significantly different financial characteristics.

Of the 50 firms in the growth group, 38 were classified correctly. Of the 50 firms chosen at random, 41 were classified correctly. That is, 79 firms or 79 percent were classified correctly.

To test whether a 79 percent correct classification rate is statistically significant, we use Press's Q test (Hair et al, 1992, 106):

$$(3)\quad \text{Press's } Q = \frac{[N-(n \times k)]^2}{N(k-1)}$$

where:

N = Total sample size

N = Number of cases correctly classified

K = Number of groups.

Press's Q is a Chi-square random variable with one degree of freedom. In this case:

$$(4)\quad \text{Press's } Q = \frac{[100-(79 \times 2)]^2}{100(2-1)} = 33.64, > \chi^2_{.05} = 3.84 \text{ with 1 degree of freedom.}$$

The null hypothesis that the percentage classified correctly is not significantly different from what would be classified correctly by chance is rejected. The evidence suggests that the discriminant function did a good job of separating the two groups.

The arithmetic signs of the adjusted coefficients in Table 1 are important. A positive sign indicates that the greater a firm's value for the variable the more likely it will be a RSF. On the other hand, a negative sign for an adjusted coefficient signifies that the greater a firm's value for the variable, the more likely it will be classified as a HGF. Thus, according to Table 1, the greater the size of the firm, the greater the rate of systematic risk, the greater the return to total capital, and the greater the price-earnings multiple, the more likely it is that the firm will be an HGF. Conversely, the greater the amount of unsystematic risk, the less likely the firm will be a HGF.

The relative contribution of each variable to the total discriminating power of the function may be obtained by standardizing (pooled within group variances) the canonical coefficients of the discriminant function. These coefficients are given in the output of the BMDP-07.M program. Alternatively, the coefficient weights may be obtained by adjusting the discriminant coefficients for differences in the units of measure of the original variables. This adjustment is made arithmetically by multiplying the square root of the diagonal elements of the variance-covariance matrix for each variable by the discriminant coefficient of that variable. The product of this multiplication also gives the relative contribution of each variable to the total discriminating power of the function (Altman, 1968). Standardized canonical coefficients are shown in Table 1.

An examination of Table 1 reveals that beta (systematic risk) is the variable with the greatest contribution to the overall discriminating function, followed by return to total capital, unsystematic risk, the price earnings multiple, and size, respectively.

Some multicollinearity exists between the variables, because the numerator in the price earnings ratio may depend on all the other variables. Hair, et al (1992) write that this consideration becomes critical in stepwise analysis and may be the factor determining whether a variable should be entered into a model. However, when all variables are entered into the model simultaneously, the discriminatory power of the model is a function of the variables evaluated as a set.

The discriminating power of an individual variable is measured by its adjusted discriminant coefficient. If that adjusted coefficient is small in relation to the other variables, multicollinearity has little effect. Table 1 shows that the adjusted coefficient for the price earnings ratio was fourth in rank and was small

compared to the first three. The only conclusion that can be drawn from the analysis is that high price earnings ratios are associated with the HGF. The variable would do little however to identify a HGF.

TABLE 1

Relative Contribution of the Variables

Variables	Adjusted Coefficient	Rank
Systematic Risk	-.68492	1
Logarithm of Sales	-.09421	5
Return on Total Capital	-.48105	2
Price Earnings Multiple	-.13820	4
Unsystematic Risk	.25807	3

VALIDATION OF THE MODEL

Before any general conclusions can be drawn, determination must be made whether the model works for any group of randomly drawn firms. The procedure used here for validation is referred to as the Lachenbruch or, more informally, the "jackknife" method. In this method, the discriminant function is fitted to repeatedly drawn samples of the original sample. The procedure estimates (k - 1) samples, and eliminates one case at a time from the original sample of "k" cases (Hair et al, 1992, 98). The expectation is that the proportion of firms classified correctly by the jackknife method would be less than that in the original sample due to the systematic bias associated with sampling errors. The major issue is whether the proportion classified correctly by the validation test differs significantly from the original test. That is, is the difference in the two proportions classified correctly by the two tests due to bias? The objective is to see if this bias is significant. The jackknife validation resulted in the correct classification of 77 percent of the firms. Since there are only two samples for analysis the binomial test is appropriate:

$$(5)\quad \frac{77 - 100\ (.79)}{[100(.79)(.21)]^{1/2}} = -0.593 < t_{.05} = 1.645$$

Thus, the null hypothesis that there is no significant difference between the proportion of firms classified correctly in the original test and the proportion classified correctly in the validation test cannot be rejected. Therefore, it can be concluded that while there are some biases in the original analysis, they are not significant. The procedure will classify new firms as well as it did in the original analysis. This means the model can be used for identifying firms that may increase in value during economic downturns.

CONCLUSION

The purpose of this study was to establish a risk-return profile of firms that experience extraordinary growth in periods of economic decline. Three of the five results were as expected, one simply had no prior expectation, and one was a mild surprise. The risk-return tradeoff curve is probably higher for firms that grow during periods of economic downturn than for firms selected at random. Thus, the expectation was that return to total capital, systematic risk, and the price-earnings multiple would be higher for growth firms. The analysis also showed those firms were larger in size. It was not clear from previous studies that this would be the case. The unexpected result was that growth firms had less unsystematic risk. Investors diversify this away and do not expect to be compensated for assuming it, but a single firm has to cope

with it and produce returns to offset it. There will be no attempt here to analyze why the variable profile is as it is, but it is an area that may deserve further study.

A further objective was to find out if the financial profile could be used to predict which firms would be growth firms during an economic decline. Evidence suggests that the model does predict growth firms accurately for any set of randomly drawn firms. This study is particularly timely because of the Federal Reserve's objective of maintaining low inflation, preventing the U.S. economy from growing at a destabilizing pace, and its recurring desire to slow the rate of economic growth.

The profile of financial characteristics of firms that grow in periods of economic decline should aid investors, institutions, and managers in identifying firms that have the potential for growth in future periods. For example, if the consensus forecast among business economists calls for an economic downturn, investors and financial institutions may find advantages in reallocating their portfolio of equity investments (or implementing some hedging strategies) on the basis of these findings. The results indicate that investors may want to increase their equity positions in larger firms, with higher betas, higher P/E ratios and higher returns on total equity, and reduce their position in companies with high levels of unsystematic risk.

On the other hand, if portfolio managers do not believe that reductions in the rate of economic growth can be predicted accurately, the results of this study are not as useful. One should expect, however, that some companies will implement preemptive moves on the basis of the best available forecasts.

ENDNOTES

1. The "textbook" definition of recession is two consecutive quarters of negative growth in real G.D.P. (Samuelson, 1989 p. 204). The McGraw-Hill Dictionary of Modern Economics defines a recession as (... a decline in overall business activity) lasting an indefinite period. However, the Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) establishes whether or not a given period is actually a recession. It is in fact, whatever they say it is. For example, in 1980 they identified a recession that lasted one quarter.

APPENDIX I – GROWTH FIRMS

1. ADC Telecommuinications
2. Adobe Systems
3. ADVANTA Corporation
4. ALPHARMA Incorportated
5. ALZA Corporation
6. American International group
7. Applied Materials
8. Autodesk, Incorporated
9. Automatic Data Processing
10. Biomet
11. Bio-Rad Laboratories
12. Bombardier Incorporated
13. Brinker International
14. CUC International
15. Cable & Wireless ADR
16. Casey's General Stores
17. Cerner Corporation
18. Checkpoint Systems
19. Cintas Corporation
20. Circuit City Stores
21. Claire's Stores
22. Clayton Homes
23. Coca-Cola
24. Compaq Computer
25. Computer Associates
26. Computer Sciences
27. Consolidated Stores
28. Countrywide Credit
29. Cracker Barrel
30. Crown Cork
31. DSC Communication
32. Datascope Corporation
33. Diagnostic Products
34. Dionex Corporation
35. Disney (Walt)
36. Electronic Arts
37. Forest Laboratories
38. Franklin Resources
39. Gap (The), Incorporated
40. General Motors
41. Getty Petroleum
42. Gilette
43. Great Lakes Chemical
44. Green Tree
45. Hewlett-Packard
46. Home Depot
47. ICN Pharmaceuticals
48. Intel Corporation
49. Invacare Corporation
50. KLA Instruments

APPENDIX II – RANDOMLY SELECTED FIRMS

1. Alberto Culver
2. Alltel Corporation
3. American Express
4. American Software
5. Analog Devices
6. Banc Bilbao Vizcaya
7. Banco Santander
8. BCE, Incorporated
9. Blair Corporation
10. Boeing Company
11. Boston Scientific
12. Cadbury Schweppes
13. Cardinal Health
14. Computer Science
15. Finova
16. Fisher Scientific International
17. Fiserv, Incorporated
18. Furon
19. General Host
20. Genetics Institute
21. General Nutrition
22. Gerber Scientific
23. Glaxo Wellcome
24. Hees International
25. Informix Corporation
26. Instron Corporation
27. Intron Corporation
28. Jacobson Stores
29. Johnson Worldwide
30. Lowe's Companies
31. Marquette International
32. Newbridge Networks
33. Nine West
34. NPC International
35. Owens & Minor, Incorporated
36. Piccadilly
37. Polaroid Corporation
38. Power Corporation
39. Rhone-Poylenc Rorer
40. Sealright Company
41. S-K-I Limited
42. Spacelabs Medical, Incorporated
43. Sun Energy
44. Transamerica
45. Thor Industries
46. Triad Systems
47. Uniforce
48. Unitrode Corporation
49. Weis Markets
50. Willis Corroon

APPENDIX III - INDUSTRIES

	INDUSTRIES	NUMBER OF GROWTH FIRMS	NUMBER OF RANDOM FIRMS
1.	Aerospace/Defense	1	1
2.	Chemical	1	1
3.	Computer & Peripherals	2	2
4.	Computer Software & Services	6	6
5.	Drug	3	3
6.	Financial Services	5	5
7.	Foreign Telecommunication	1	1
8.	Grocery	1	1
9.	Healthcare Information	1	1
10.	Industrial Services	1	1
11.	Insurance (diversified)	1	1
12.	Manufactured Housing/Recreational	1	1
13.	Medical Supplies	6	6
14.	Packaging & Container	1	1
15.	Petroleum (integrated)	1	1
16.	Precision Instrument	3	3
17.	Recreation	2	2
18.	Restaurant	2	2
19.	Retail Building Supply	1	1
20.	Retail (special lines)	3	3
21.	Retail	1	1
22.	Semiconductor	2	2
23.	Soft Drink	1	1
24.	Telecommunication Equipment	2	2
25.	Toiletries Cosmetic	1	1
		50	50

REFERENCES

Altman, Edward I. "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy." *Journal of Finance* 23, no.4, September 1968: 589-609.

Basu,S. "The Investment Performance of Common Stocks in Relation to Their Price-Earnings Ratio: A Test of the Efficient Market Hypothesis. *Journal of Finance,* June 1977, 663-682.

Cooley, William W., and Paul R. Lohnes, *Multivariate Data Analysis.* New York: John Wiley & Sons, 1971.

Dixon, Wilfrid J., ed. *Biomedical Computer Programs.* Berkeley: University of California Press, 1971.

Durand, David D. "Risk Elements in Consumer Installment Financing." *Studies in Consumer Installment Financing.* New York: National Bureau of Economic Research, 1941, 105-142.

Edmister, Robert O. "An Empirical Test of Financial Ratio Analysis for Small Business Failure Prediction." *Journal of Financial and Quantitative Analysis* 7, no.2, March 1982, 1477-1492.

Frank, R.E., Massey, W.F., and Morrison, D.T. "Bias in Multiple Discriminant Analysis." *Journal of Marketing Research* 11: August 1965, 227-130.

Gannes,S. "America's Fastest-Growing Companies." *Fortune:* May 23, 1988, 127-130.

Goodman,D.A., and Peavy, J.W.,III. (1986). "The Interaction of the Firm Size and Price-Earnings Ratio on Portfolio Performance." *Financial Analyst Journal:* January-February 1986, 9-12.

Greenwald, Douglas, and Associates, *The McGraw-Hill Dictionary of Modern Economics,* New York: McGraw-Hill Publishing Company, 1983.

Hair, Joseph F., Ralph E. Anderson, Ronald L. Tatham, and William C. Black. *Multivariate Data Analysis,* New York: Macmillian Publishing Company, 1992.

Laderman, J.M. "Coming Home To Growth Stocks." *Business Week:* December 25,1989, 106-107.

Melicher, Ronald W., and Miedich, S.J. "Corporate Sales Growth Rates and Stockholder Returns: A Reply." Review *of Business and Economic Research:* Spring 1985, 34-44.

Melicher, Ronald W., and Miedich, S.J. "Corporate Sales Growth Rates and Stockholder Returns: A Reply.: *Review of Business and Economic Research:* Fall 1987 50-57.

Nerlove, M. "Factors Affecting Differences Among Rates of Return on Investments in Individual Common Stocks." *Review of Economics and Statistics,* August 1968, 312-331.

Norton, Rob. "Where is the Economy Really Heading," *Fortune* August 7, 1995, p.59.

Payne, Bruce C. "A Multiple Discriminant Investigation Into the Financial Characteristics of High Growth Firms." *Advances In Quantitative Analysis of Finance and Accounting* 2: 1993, 19-33.

Richman, Louis S. "Managing Through A Downturn." *Fortune:* 59, August 7, 1995.

Samuelson, Paul A., and William D. Nordhaus, *ECONOMICS* 13th ed., New York: McGraw-Hill Publishing Company., 1989.

Shuman, J.C., and Seeger, J.A. "The Theory and Practice of Strategic Management in Smaller Rapid Growth Firms." *American Journal of Small Business:* Summer 1986, 7-18.

Solomon, Ezra, *The Theory of Financial Management,* New York: Colombia University Press, 1963.

Stano, M. "Monopoly Power, Ownership Control, and Corporate Performance." *Bell Journal of Economics:* Autumn 1976, 672-679.

Trieschmann, James S., and George E. Pinches. "A Multivariate Model for Predicting Financially Distressed Property-Liability Insurers." *Journal of Risk and Insurance* 40, no.3: September 1973, 27-333.

"U.S. Business Cycle Expansions and Contractions." *National Bureau of Economic Research:* http://www.nber.org/cycles.html

White, R.E. "A Multivariate Analysis for Common Stock Quality Ratings." Paper presented to the 1975 meeting of the Financial Management Association, Kansas City, October.

REFEREES

1. James Brooks
2. Joseph Cheng
3. Elia Kacapyr
4. Arthur Leahy
5. John Piccione
6. David Ring
7. James Stodder
8. Wade Thomas
9. Kudret Topyan

NEW YORK STATE ECONOMICS ASSOCIATION (NYSEA)

51st ANNUAL CONVENTION

FINAL PROGRAM

State University of New York • College at Oneonta
Morris Conference Center – Oneonta, New York

October 16-17, 1998

Friday, October 16

8:00 – 10:00 PM **NYSEA Convention Opening Reception**
(LeCafe, Morris Conference Center)

Wine and Cheese Reception
Sponsored by SUNY College at Oneonta

Introduction: Wade L. Thomas, President, NYSEA

Welcome: Anne Carins Federlein, Provost/Vice President for Academic Affairs, SUNY Oneonta

Saturday, October 17

8:30 – 10:30 AM **Convention Registration & Continental Breakfast**
(Craven Lounge, Morris Conference Center)
Compliments of the Dryden Press, Harcourt Brace College Publishers
Pick up final program, receipt/register, location directions, name tags

8:30 – 2:30 PM **Textbook Display/Exhibits**
(Craven Lounge, Morris Conference Center)

8:45 AM **Sessions Begin**

12:00 – 1:30 PM **Luncheon** (Otsego Grill, Morris Conference Center)

Speaker: Abraham Lackman, Secretary of Finance Committee and Special Advisor to Senate Majority Leader
"Capital Gains Taxation: Is There Any Truth to Supply Side Economics—The Experience from New York State"

Afternoon Refreshments (Craven Lounge, Morris Conference Center)
Compliments of Irwin/McGraw-Hill Publishers

3:15 – 4:15 PM **NYSEA Business Meeting** (Room 103, Morris Conference Center)

SESSION

8:45 – 10:15 AM **Teaching** (Room 103)

Chair: Ilan Alon, SUNY Oneonta

Richard Deitz, Federal Reserve Bank of New York Buffalo Branch; and
Jeannette C. Mitchell, Rochester Institute of Technology
"Grade Expectations: An Empirical Study of Student and Faculty Assessment"

Charles Callahan, III, and William H. Dresnack, SUNY Brockport
"The User Approach Versus the Traditional Approach: A Comparison of the Effects of Introductory Accounting Course Work on Success in the First Finance Course"

John E. Page, College Dominican College
"College Economics Texts: Motivating or Intimidating?"

Discussants:
Rafael Romero, SUNY Utica/Rome
Ilan Alon, SUNY Oneonta

SESSION

8:45 –10:15 AM **Health, Education, and Welfare** (Room 104)

Chair: Kent Klitgaard, Wells College

J. Dennis Chasse, SUNY Brockport
"Conceptual Issues in Assessing the Benefit and Costs of Programs Aimed at Reducing Chemical Dependency Among Adolescents"

Niev J. Duffy, Hofstra University
"Towards an Interdisciplinary Approach to Fertility Analysis"

Elia Kacapyr, Ithaca College
"Alternative Measures of Socioeconomic Progress?"

Discussants:
Kent Klitgaard, Wells College
Jason Hecht, Ramapo College

SESSION

9:00 –10:15 AM **Business Cycles** (Room 105)

Chair: Joseph G. Eisenhauer, Canisius College

David Ring, SUNY Oneonta
"A Comparison of the Three Long Post-WWII Business Cycles"

Discussant:
Joseph G. Eisenhauer, Canisius College

SESSION

10:30 – 11:45 AM **Methodology and History of Economic Thought** (Room 103)

Chair: Tatyana Zelenskaya, Siberian Aerospace Academy

William T. Ganley, Buffalo State College
"Theoretical Pluralism in the Twentieth Century History of Economic Thought"

Bogdan Mieczkowski, Ithaca College
"Towards a Methodology of Estimating the Economic Costs of the Holocaust in Poland"

Discussants:
Alfred Lubell, SUNY Oneonta
Jeannette C. Mitchell, Rochester Institute of Technology

SESSION

10:30 – 11:45 AM **Labor Economics** (Room 104)

Chair: Charles Callahan, III, SUNY Brockport

Joseph G. Eisenhauer, Canisius College
"Unemployment Insurance and Hours of Work"

Kent Klitgaard, Wells College
"Establishing a Census Baseline for Regional Income Distribution Studies"

Discussants:
Niev Duffy, Hofstra University
Wade Thomas, SUNY Oneonta

SESSION

10:30 – 11:45 AM **Transportation and Land Economics** (Room 104)

Chair: Elia Kacapyr, Ithaca College

William P. O'Dea, SUNY Oneonta
"Congestion Pricing with an Exogenously Imposed Speed Limit"

James L. Booker, Alfred University
Frank Ward, University of New Mexico
Marshal Frazier and Robert A. Young,
Colorado State University
Ronald Lacewell and John Ellis, Texas A & M University
"Modeling Drought Impacts on an Interstate River"

Discussant:
Elia Kacapyr, Ithaca College

SESSION

1:45 – 3:00 PM **Economic Development and Growth** (Room 105)

Chair: William P. O'Dea, SUNY Oneonta

Flumo Y. Stevens, Lawrence Technological University
"The African Market: A Potential for U.S. Business and Economic Growth"

Dal Didia, Jackson State University
Baban Hasnat and Charles Callahan, III, SUNY Brockport
"Foreign Aid, Foreign Direct Investment, and Economic Growth: An Empirical Examination"

Discussant:
Alfred Lubell, SUNY Oneonta

SESSION

1:45 – 3:15 PM **Student Papers** (Room 103)

Chair: Kent Klitgaard, Wells College

Rebecca A. Hellinger, Peter G. Herrscher, Frank G. Duserick, and Ernest Enke, Alfred University
"Decision Factors in Acquiring Long Term Care Insurance"

Jodi Dennis, James Booker, Frank Duserick and Ernest Enke, Alfred University
"Financing Retirement with a Roth IRA"

Karen Enke, James Booker, Frank Duserick, and Ernest Enke, Alfred University
"Is the Marriage Tax Penalty a Sin Tax?"

Heather Eckert, Brandy Moseley, Ernest Enke, and Frank Duserick, Alfred University
"An Ounce of Prevention"

Discussants:
Kent Klitgaard, Wells College
Elia Kacapyr, Ithaca College
David Ring, SUNY Oneonta
Tom Kopp, Siena College

SESSION

1:45 – 3:00 PM **Distance Education and Educational Technology** (Room 104)

Moderator: Wade L. Thomas, SUNY Oneonta

Panelists:
Jose Medina, SUNY Delhi
Steven Blumenkrantz, SUNY Oneonta
John Nader, SUNY Delhi

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